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SR MILLINGTON SOLAR PROJECT

Shelby County, Tennessee

FINAL ENVIRONMENTAL ASSESSMENT

Prepared for:
Tennessee Valley Authority
Knoxville, Tennessee

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CHAPTER 1

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) proposes to execute a power purchase agreement (PPA) with SR Millington, LLC—the facility-specific entity affiliated with Silicon Ranch Corporation (SRC)—to purchase the electric power generated by a proposed solar photovoltaic (PV) facility near Millington, Shelby County, Tennessee. The proposed solar facility known as "Millington Solar Facility", would have direct current (DC) generating capacity of 68.5 megawatts (MW) with an alternating current (AC) output of 53 MW. The proposed solar facility would be constructed and operated by SR Millington, LLC. In addition to entering into a PPA with SR Millington, TVA would also construct a 5-mile long 161-kilovolt (kV) transmission line connection to the solar facility.

The proposed Millington Solar Facility would occupy approximately 390 acres of a 438-acre tract within the city limits of Millington, Tennessee, approximately 2 miles northeast of the city center (Figures 1, 2, and 3). The 438-acre tract is comprised of two land parcels owned by SRC (one 352-acre parcel, and a 14-acre portion of another parcel; approximately 366 acres total) and two portions of one parcel leased by SRC from the U.S. Navy (Navy, 72 acres total); the 438-acre tract is known herein as the "project site." SRC will lease the entire project site to SR Millington, LLC for the construction, operation, and maintenance of the Millington Solar Facility. The solar generating facility would consist of multiple parallel rows of PV panels on single-axis tracking structures, DC to AC inverters and transformers. SR Millington would also construct and operate an onsite substation, and a 2-mile long 12.47- kV distribution line for distributing power generated by the solar facility.

The TVA 161-kV transmission line (called the Shelby-Millington Solar 161-kV Transmission Line) constructed by TVA would connect the Millington Solar Facility to the TVA electrical transmission network. The construction, operation, and maintenance of the Millington Solar Facility, including the new on-site substation, new 12.47-kV distribution line, and new 161-kV transmission line is known herein as the "Project." For the analysis in Chapter 3, the proposed distribution line is included in the Millington Solar Facility site and the proposed TVA transmission line is analyzed separately in this document.

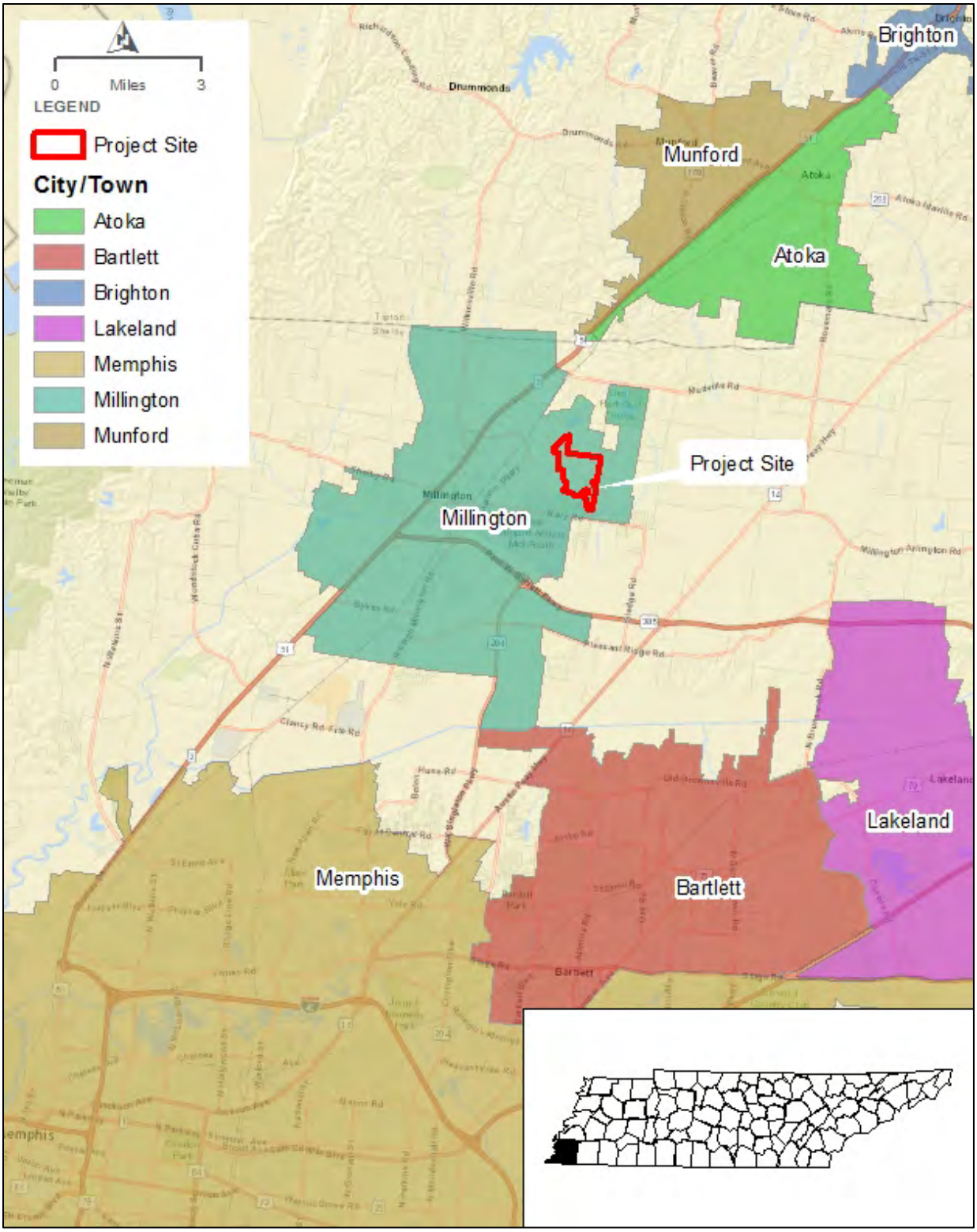

Figure 1. Site location in Shelby County, Tennessee.

1.1 PURPOSE AND NEED FOR ACTION

TVA's 2015 Integrated Resource Plan (IRP, TVA 2015a) recommends the expansion of renewable energy generating capacity, including the addition of between 175 and 800 MW (AC) of solar capacity by 2023. The Proposed Action would help meet this need for additional solar capacity. Additionally, the Proposed Action would provide energy security to the adjacent Naval Support Activity (NSA) Mid-South facility to help meet the Navy's renewable energy goals. The Navy's energy strategy is centered on energy security, efficiency, and sustainability. Energy security safeguards the Navy's infrastructure and protects the Navy from a volatile energy supply. In 2009, the Secretary of the Navy established alternative energy goals for the Navy's shore-based facilities to reach by 2020 that included producing at least 50 percent of the total quantity of electric energy consumed by shore-based facilities from alternative sources. The Navy's goals and energy strategy are aligned with other federal renewable and alternative energy directives, including Executive Order (E.O.) 13693, Planning for Federal Sustainability in the Next Decade; the Energy Policy Act of 2005 (EPAct; 42 U.S.C. 15852); the Department of Defense renewable energy goals contained in 10 U.S.C. 2911(e), and the 2013 Presidential Memorandum "Federal Leadership on Energy Management," and the Secretary of the Navy's 1 Gigawatt Initiative (U.S. Department of the Navy 2017).

In support of the Secretary of the Navy's 2009 energy goals and the federal energy goals, the Secretary of the Navy created the 1 Gigawatt (GW) Initiative—named for the amount of energy generation capacity to be produced by 2020 on or near Navy installations. To achieve 1 GW of renewable energy generation capacity by 2020, the Navy recognized the need to develop opportunities for large-scale projects that would be attractive to local utilities and that leasing land for construction and operation of a solar PV system would support the goal of renewable energy for both on- and off-base consumption using the commercial or public electrical energy grid (U.S. Department of the Navy 2017). The Navy established the Resilient Energy Program Office (REPO) to specifically work with local commercial utilities to use private-sector funds to construct renewable energy facilities on Navy property. To meet its goal of increased solar capacity and the Navy's need for energy security, TVA issued a Request for Proposal (RFP) and solicitation in October 2015 for the generation and delivery of renewable energy from a single PV energy provider. The RFP indicated that the solar facility must be located on 72 acres of Navy property at NSA Mid-South and the adjoining property that was owned by Millington Industrial Development Board (MIDB). The PV site developer would then purchase the property from MIDB and lease the land from the Navy for the solar facility. No energy output goal was established, but the Navy asked that their 72-acre property be maximized with the greatest amount of output possible, which was 8 to 9 MW. Following its evaluation of responses to the RFP, TVA selected SRC and negotiated the PPA for SR Millington, LLC to generate and deliver the requested solar power.

1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and NEPA's implementing regulations promulgated by the Council on Environmental Quality ([CEQ], 40 Code of Federal Regulations [CFR] §§ 1500–1508), federal agencies are required to evaluate the potential

environmental impacts of their proposed actions. This environmental assessment (EA) was prepared in accordance with NEPA, CEQ's regulations, and TVA's procedures for implementing NEPA (TVA 1983) to evaluate the potential impacts of TVA's Proposed Action (the purchase of power under the PPA) and the associated impacts of the construction and operation of the proposed Project.

The Navy has determined that its action of leasing the 72 acres of the NSA Mid-South installation to SRC for the construction and operation of the proposed Project is a candidate for a Categorical Exclusion (CatEx) in accordance with the Navy's NEPA procedures and guidelines. The CatEx was approved February 12, 2016. Due to the Project's interconnection with TVA, the entire 438-acre project site, including the 72-acre portion and AC output on the naval leased land, is included within the area of impact assessed in this EA.

TVA's Proposed Action would result in the construction and operation of the proposed solar facility by SR Millington, LLC, including the new on-site substation and new distribution line, as well as actions taken by TVA to connect the solar facility to the TVA transmission system. The scope of this EA, therefore, covers not only impacts related to the construction and operation of the proposed solar facility but also that of the associated electrical interconnections.

This EA (1) describes the existing environment in the project area, (2) analyzes potential environmental impacts associated with the Proposed Action and the No Action Alternative, and (3) identifies and characterizes cumulative impacts that could result from the proposed Project in relation to other ongoing or reasonably foreseeable proposed activities within the surrounding area of the project site. The "project area" is the potentially affected areas within and beyond the project site and varies by each resource area as defined in Chapter 3.

Under the PPA, TVA's obligation to purchase renewable power is contingent upon the satisfactory conclusion of the environmental review and TVA's determination that the Proposed Action will be "environmentally acceptable." To determine acceptability, TVA must conclude that no significant impacts to the human environment would result from the location, operation, and/or maintenance of the proposed generating facility and that all project activities would be consistent with all applicable federal, state, and local environmental laws and regulations.

Based on internal scoping, identification of applicable laws, regulations, executive orders, and policies, TVA identified the following resource areas for analysis within this EA: Land Use; Geology, Soils, and Prime Farmland; Water Resources; Biological Resources; Visual Resources; Noise; Air Quality and Greenhouse Gases; Cultural Resources; Utilities; Waste Management; Public and Occupational Health and Safety; Transportation; Socioeconomics; and Environmental Justice.

This EA consists of six chapters discussing the Alternatives, resource areas potentially affected, and analyses of impacts. Additionally, this document includes six appendices, which contain more detail on technical analyses and supporting data. The structure of the EA is outlined below:

- **Chapter 1:** Describes the purpose and need for the Project, the decision to be made, related environmental reviews and consultation requirements, necessary permits or licenses, and the EA overview.
- **Chapter 2:** Describes the Proposed Action and No Action Alternative, provides a comparison of the Alternatives, lists the proposed mitigation measures, and identifies the Preferred Alternative.
- **Chapter 3:** Discusses the affected environment and the potential direct and indirect impacts on these resource areas. Mitigation measures are also proposed, as appropriate.
- **Chapter 4:** Discusses the cumulative impacts in relation to other ongoing or reasonably foreseeable proposed activities within the surrounding area of the project site.
- **Chapters 5 and 6:** Contain the List of Preparers of this EA, and the References cited in preparation of this EA, respectively.
- **Appendix A:** TVA Right-of-Way Clearing Specifications
- **Appendix B:** TVA Environmental Quality Protection Specifications for Transmission Line Construction
- **Appendix C:** TVA Transmission Construction Guidelines near Streams
- **Appendix D:** TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction
- **Appendix E:** TVA Right-of Way Vegetation Management Guidelines
- **Appendix F:** Correspondence and supporting information

1.3 PUBLIC INVOLVEMENT

SRC announced the proposed Millington Solar Facility at a public event on April 27, 2016. Another meeting was held on March 10, 2017, at Millington Town Hall to discuss local permitting with the Millington Zoning and Planning Commission in regards to the proposed solar facility.

For the proposed Shelby-Millington Solar 161-kV Transmission Line, TVA developed a public communication plan that included a website with information about the potential alternative transmission line routes and instructions on how to submit comments. TVA held an open house in Millington on September 15, 2016, to provide information, answer questions, and receive comments about the proposed transmission line. Property owners potentially affected by, or near to, any of the route alternative segments and both elected officials and naval officials were invited to the open house. TVA used local news outlets and notices placed in local newspapers to notify other interested members of the public of the open house.

The TVA open house was attended by a total of 34 people. At the open house, TVA presented maps with a network of four alternative transmission line routes to the public for comment. Information about the proposed solar facility was also available at the open house. The interest of those who attended the open house pertained primarily to the effects of the proposed

transmission line to the individual landowners, including impacts on development and/or property values. A 30-day public review and comment period was held following the open house, during which TVA accepted public comments on the alternative transmission line routes and other issues. A toll free phone number and facsimile number were made available to facilitate comments. During the comment period, one comment was received by TVA concerning the proposed transmission line location.

At the conclusion of the comment period, TVA considered additional information and developed a preferred route. TVA announced the preferred route of the Shelby-Millington Solar 161-kV Transmission Line to the public in April 2017 (Figure 6). Letters were sent to affected property owners and elected officials, and information was provided to the public through TVA's website at https://www.tva.gov/Energy/Transmission-System/Transmission-System-Projects/Millington-Tennessee-Proposed-Millington-Solar-Transmission-Project.

1.4 REQUIRED PERMITS AND LICENSES

1.4.1 Solar Facility

A Tennessee Construction General Permit (National Pollutant Discharge Elimination System [NPDES] Permit No. TNR100000) for discharges of storm water associated with construction activities (Construction General Permit) would be required for construction of the solar facility on the 438-acre project site and the 12.47-kV distribution line. NPDES Permit No. TNR100000 is a general permit issued by the Tennessee Department of Environment and Conservation (TDEC) authorizing discharges associated with construction activities that result in a total land disturbance of 1 acre or greater and sites less than 1 acre but part of a larger common plan, development or sale, as governed by Section 402 of the Clean Water Act (CWA).

A site-specific Stormwater Pollution Prevention Plan (SWPPP) is required for the Construction General Permit and must be developed and submitted to TDEC as part of the permitting process. The SWPPP addresses all construction-related activities from the date construction commences to the date of termination of permit coverage. The design, inspection, and maintenance of Best Management Practices (BMPs) must be prepared in accordance with good engineering practices and shall be consistent with the requirements and recommendations contained in the Tennessee Erosion and Sediment Control Handbook.

Activities in Waters of the U.S. (or jurisdictional waters), including wetlands and streams, are regulated by state and federal agencies to ensure no net loss of wetland resources. Under Clean Water Act (CWA) Section 404, activities resulting in the discharge of dredge or fill into Waters of the U.S., and associated secondary effects, must be authorized by the U.S. Army Corps of Engineers (USACE) through a Nationwide, Regional, or Individual Permit. CWA Section 401 requires state water quality certification for projects requiring USACE approval, pursuant to the Federal Water Pollution Control Act (33 U.S.C 1251, 1341). In Tennessee, the Department of Environment and Conservation (TDEC) is responsible for issuance of water quality certifications, pursuant to Tennessee Water Quality Control Act (TCA § 69-3-108, 0400-40-07) and Tennessee's water quality criteria and anti-degradation statement (TCA 0400-40-03). Lastly, Executive Order 11990 requires federal agencies to minimize wetland destruction,

loss, or degradation, and preserve and enhance natural and beneficial wetland values, while carrying out agency responsibilities (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010).

A CWA Section 404 Nationwide Permit (NWP) Number 51 (Land-Based Renewable Energy Generation Facilities) is required for permanent and temporary fill into jurisdictional wetlands and streams due to access road crossings, trenching, and clearing on the project site. NWP 51 is a general permit issued by the U.S. Army Corps of Engineers (USACE) that authorizes discharges of dredged or fill material into all Waters of the U.S., including streams and wetlands, provided the activity meets specific criteria. SR Millington, LLC submitted a NWP 51 preconstruction notification (PCN) to the USACE Memphis District for approval and USACE issued permit authorization on May 5, 2017 (USACE file number MVM-2016-122). Section 404 permits require water quality certification as set forth in Section 401 of the CWA prior to discharging fill materials into Waters of the U.S. Section 401 requires any applicant requesting a federal permit or license for activities that may result in discharges to first obtain a certification from the State that the permitted discharges comply with the State's applicable effluent limitations and water quality standards. The TDEC Division of Water Resources issues this Section 401 water quality certification in the form of an Aquatic Resource Alteration Permit (ARAP). The proposed project impacts are authorized under the general and special conditions of the TDEC ARAP (NR1705.016) for Minor Alterations to Wetlands. TDEC issued Notice of Coverage under this general permit to SR Millington, LLC for the proposed Millington Solar Facility on April 25, 2017, which expires April 6, 2020 (Appendix F).

1.4.2 Transmission Interconnection

Generally, a NPDES Construction General Permit would be required from TDEC for the discharge of construction site storm water. A NPDES Construction General Permit would be required for construction of the transmission line if the project disturbs more than 1 acre. This permit also requires the development of a SWPPP. For the transmission line, TVA would prepare the required SWPPP and coordinate them with the appropriate state and local authorities. An ARAP would be obtained from TDEC for any stream alterations located within the proposed right-of-way (ROW) that may be necessary and a Section 404 NWP would be obtained from USACE if construction activities result in the discharge of dredge or fill into waters of the U.S. A permit may also be required for burning trees and other combustible materials removed during transmission line construction. A permit would be obtained from Tennessee Department of Transportation (TDOT) for the crossing of any state highways during transmission line construction.

CHAPTER 2

2.0 DESCRIPTION OF THE ALTERNATIVES

This chapter explains the rationale for identifying the alternatives to be evaluated, describes each alternative, provides a comparison of alternatives with respect to their potential environmental impacts, and identifies the preferred alternative.

This EA evaluates two alternatives: the No Action Alternative and the Proposed Action Alternative.

2.1 NO ACTION ALTERNATIVE

The No Action Alternative provides a baseline of conditions against which the impacts of the Proposed Action Alternative can be measured. Under the No Action Alternative, TVA would not purchase the power generated by the Project under the 20-year PPA with SR Millington, LLC (i.e., TVA would not be involved with the Project) and the solar facility, including the portion of the project site within the naval leased land, would not be constructed and operated by SR Millington, LLC. Existing conditions (land use, natural resources, visual resources, physical resources, and socioeconomics) in the project area would remain unchanged. The project site would remain as predominantly pastureland and periodic mowing would likely continue on site and SRC would retain the property for future development. The majority of the site is owned by SRC and the land leased from the Navy is for an estimated 37 years, so site control would be maintained for longer than the 20-year PPA period. If TVA chooses not to approve the Project, the Navy could lease the land for solar energy production through a PPA with SR Millington, LLC. TVA would continue to rely on other sources of generation described in the 2015 IRP (TVA 2015a) to ensure an adequate energy supply and to meet its goals for increased renewable energy generation. The Navy would have to pursue other sources of energy to meet its alternative energy, energy security, and sustainability goals at NSA Mid-South.

2.2 PROPOSED ACTION ALTERNATIVE

Under the Proposed Action Alternative, TVA would execute the 20-year PPA with SR Millington, LLC and SR Millington, LLC would construct and operate a 68.5-MW DC single-axis tracking PV solar power facility in Shelby County, Tennessee. The 68.5 MW DC output generated by the solar facility will be converted to 53 MW AC output for use by the electrical network (Section 2.2.1). The Project would occupy approximately 390 acres of the project site, which is comprised of portions of three parcels, approximately 2 miles northeast of downtown Millington. The entire project AC output (53 MW AC of 68.5 MW DC), including the naval portion, would be sold to TVA and would interconnect to TVA's existing Shelby-Drummonds 161-kV transmission line. Under the Proposed Action, TVA would construct a new, approximately 5-mile-long 161-kV transmission line (Shelby-Millington Solar 161-kV Transmission Line) between the existing TVA line—located approximately 3 miles northeast of the Millington Solar Facility site and approximately 0.5 mile north of Mudville Road—and a new 161-kV Millington Solar Facility substation. SR Millington, LLC would also construct a new, approximately 2-mile-long 12.47-kV distribution line connecting the Project substation to the NSA Mid-South facility's switching

station located on Singleton Avenue approximately 0.25 mile south of Navy Road, which would ultimately interconnect back to the TVA network. This EA assesses the impact of TVA's action to enter into the PPA with SR Millington, LLC, and the associated impacts of the construction and operation of the proposed solar facility by SR Millington, LLC, and the 12.47-kV and 161-kV electrical interconnections by the Navy and TVA, respectively.

2.2.1 Project Description

The project site is 438 acres of predominantly fallow pastureland, approximately 2 miles northeast of downtown Millington. The project site is comprised of portions of three contiguous land parcels (parcel number M0115 00998, and portions of parcel numbers M0115 00997 and M0116 00410), approximately 52 acres, 14 acres, and 72 acres, respectively. The 352-acre and 14-acre tracts were previously owned by MIDB and were sold to SRC on May 27, 2016. The SRC-owned tracts are predominantly fallow pastureland with some small forested areas along the western project site boundary and in the northeastern corner. The 72 acres of land is owned by the Navy and being leased to SRC for the Project. The leased land is predominantly developed land with some fallow pastureland and a small portion of undeveloped forest along the southwestern boundary (Figure 2).

The project site is adjacent to the Millington Regional Jetport (NQA), Glen Eagle Golf Course, Bethuel Road, and crop/pastureland and is accessible by Kerrville Rosemark Road and Attu Street/Attu Extended, both privately-owned/naval-owned paved roads that cross the project site. Multiple dirt roads bisect the project site and an unnamed stream flows north-south through the project site. The NSA Mid-South facility is south of the project site on the south side of Navy Road.

The proposed solar facility would occupy approximately 390 acres. The perimeter of the 390-acre area of solar arrays, access roads, and electrical infrastructure, including new substation, would be enclosed by chain-link security fencing (Figure 3). The remaining 48 acres of the 438-acre project site outside of the fenced-in area would be primarily undeveloped.

The proposed Millington Solar Facility would connect to a new TVA 161-kV transmission line via a new on-site substation. A portion of the power generated by the overall project (approximately 8 to 9 MW DC) located on the naval leased land would be transmitted from the new on-site substation to the NSA Mid-South facility via a new In-Kind Consideration (IKC) 12.47-kV distribution line.

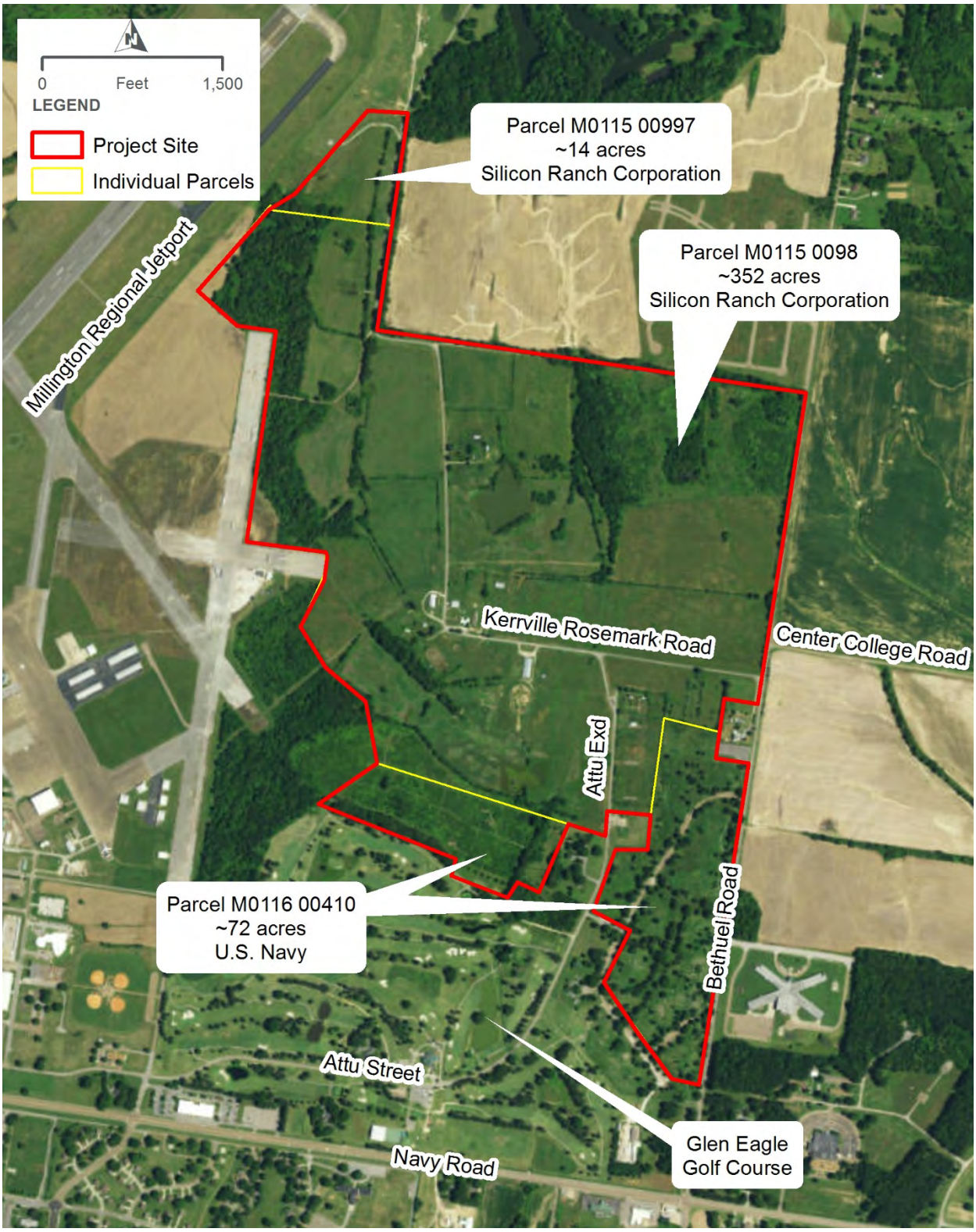

Figure 2. Aerial photograph showing Millington site boundary.

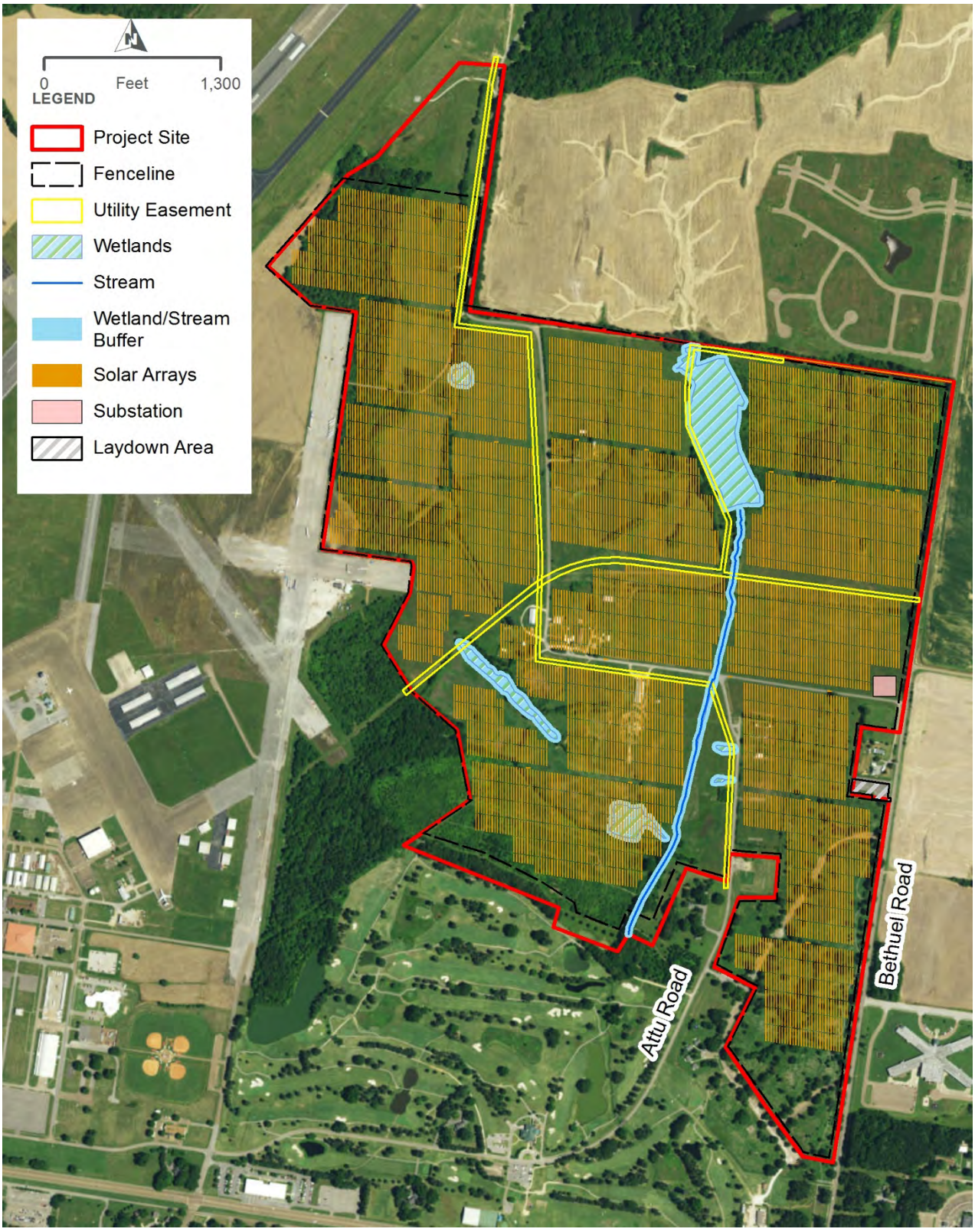

Figure 3. Aerial photograph showing layout of solar facility components.

The solar arrays utilized for the Proposed Action would be composed of multiple polycrystalline PV modules or panels. PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current is produced, which can be used as electricity (TVA 2015b). This Project would convert sunlight into DC electrical energy within polycrystalline PV panels (Figure 4).

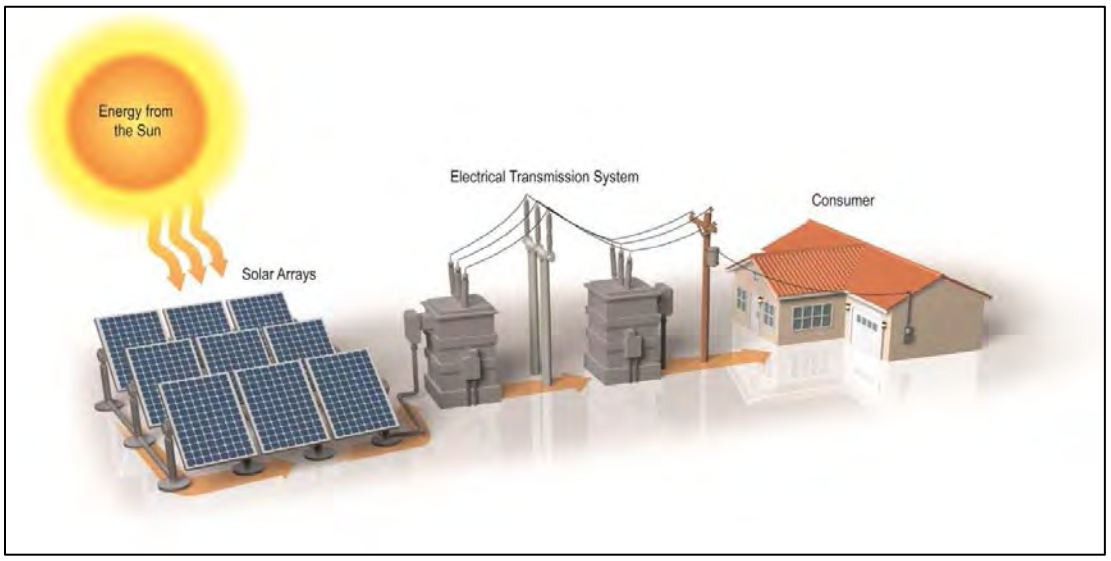

Figure 4. General energy flow diagram of PV solar system (not to scale).

The Millington Solar Facility would be comprised of a total of approximately 600,000 PV panels (modules), each capable of producing approximately 117.5 watts, and mounted together in arrays. The solar panels would be a combination of First Solar and LG modules. All panels on the leased area are LG modules. The panels would be anchored on a single pole, between 4 and 7 feet in height. The First Solar panels are 1,200 millimeters (mm) long by 600 mm wide (approximately 4 feet by 2 feet). The LG panels are 2,024 mm long by 1,024 mm wide (approximately 6.6 feet by 3.4 feet). The panel arrays would be grouped into 17 individual blocks, each containing between 135 and 170 trackers of panels, each with an output of approximately 3.06 MW (3,060 kilowatts [kW]) AC. Each block would consist of the PV arrays and a power conversion station (PCS), or inverter station on concrete pads, that includes 1,500 Volt (V) power inverters and transformers to convert the DC electricity generated by the solar panels into AC electricity for transmission across the Project's electrical collection system and to the off-site distribution system and substations. The PV panels would be mounted on motor-operated axis tracker structures,

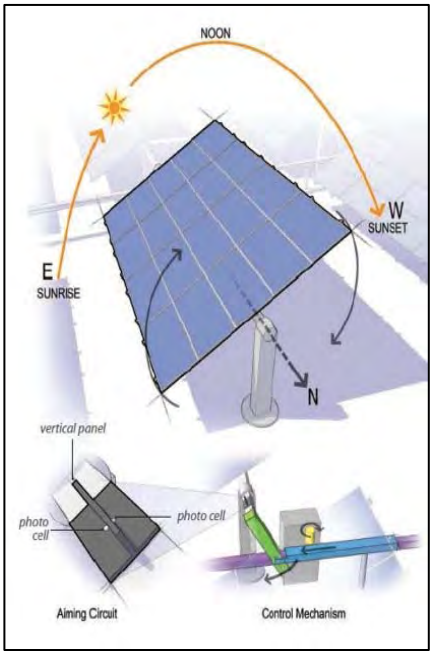

Figure 5. Diagram of single-axis tracking system (not to scale).

commonly referred to as single-axis trackers. The axis trackers would be designed to pivot the panels along their north-south axes to follow the path of the sun from the east to the west across the sky (Figure 5). The tracker assemblies would be constructed in parallel north-south rows using steel piles installed using either a vibratory pile driver or helical piles with a depth of 6 to 10 feet below grade and arranged to avoid streams and wetlands on the project site to the maximum extent practicable.

The PV modules would be electrically connected in series (called a "string") by wire harnesses that conduct DC electricity to combiner boxes. Each combiner box would collect power from several strings of modules and feed an inverter via cables placed in excavated trenches. The trenches would be approximately 3 feet deep and 1 to 4 feet wide. The bottom of each trench would be lined with clean fill to surround the DC cables, and the remainder of the trench would be backfilled with native soil and then appropriately compacted. Aboveground cables would be used to connect the modules to harnesses that lead wiring to combiner boxes.

The AC current from each individual inverter would be transformed into the AC collection voltage, 34.5 kV. The underground voltage collection circuits would deliver AC electricity from the transformers to the Project's 161-kV on-site substation which is proposed north of Kerrville Rosemark Road and west of Bethuel Road (Figure 3). These circuits would be buried underground by trenching and cross a stream and several wetlands. Buried electrical cables would connect the rows of PV panels to 1,500V power inverters. The inverters would be connected by buried cables to 17 pad-mounted 34-kV transformers, which would connect to SR Millington's new on-site substation at the corner of Kerrville Rosemark Road and Bethuel Road. Buried electrical cables would continue from each transformer to the on-site substation. Trenches for buried cables would be backfilled and the ground surface returned to its original grade. The Millington Solar Facility would connect from the new on-site substation to TVA's Shelby 500-kV Substation approximately 5 miles northeast of the project site via a new, proposed TVA transmission line. The new on-site substation would also connect to a new, proposed 12.47-kV distribution line which would extend south from the project site approximately 2 miles to the NSA Mid-South's 12.47-kV East Switching Station. Additional details on the electrical interconnection with the TVA system are given below in Section 2.2.3.

The entire AC (53 MW AC) project energy output would be sold to TVA and would interconnect via a new 161-kV TVA transmission line that would be approximately 5 miles in length and connect back to TVA's Shelby 500-kV Substation. A portion of the overall project capacity would be located on the naval leased land (72 acres). The Navy has requested that SR Millington, LLC place as many panels as economically and technically feasible on the leased property. The new 12.47-kV distribution line would be paid for by SR Millington, LLC and would extend southwest from the project site to the East Switching Station, so that in the event of a power or grid outage, the Navy will have the availability to access the solar power and reduce outage periods. The current estimate of the project capacity to be constructed on the naval leased acreage is 8 to 9 MW DC of the total project capacity.

2.2.2 Project Construction

Construction of the solar power facility generally requires site preparation (surveying and staking, removal of tall vegetation/small trees, light grading/clearing, installation of a perimeter security fence, installation of sediment traps, and preparation of construction laydown areas) prior to solar array assembly and construction, which includes driving steel piles for the tracker support structures, installation of solar panels, and electrical connections and testing/verification.

SR Millington LLC's standard practice is to work with the existing landscape (e.g., slope, drainage, utilization of existing roads) where feasible and minimize or eliminate grading work to the extent possible. Any required grading activities would be performed with portable earthmoving equipment and would result in a consistent slope to the local land. Prior to grading, native topsoil would be removed from the area to be graded and stockpiled on site for redistribution over the disturbed area after the grading is completed. Silt fence, sediment traps, and other appropriate controls would be used (as needed) to minimize exposure of soil and to prevent eroded soil from leaving the work area. Disturbed areas would be seeded and stabilized within 14 days after construction using a mixture of certified weed-free, low-growing native grass seed obtained from a reputable seed dealer and in compliance with the requirements established by the local Natural Resource Conservation Service (NRCS). Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is stable. Water would be used for soil compaction and dust control during construction.

Grading would consist of the excavation and compaction of earth to meet the final design requirements. Due to the existing topography of the site and the use of single-axis tracking, cut and fill grading activities would be required to achieve the final design and maximum slope criteria. Grading at the site is expected to result in a net zero balanced cut and fill quantity of earthwork to the extent practical and therefore not require any off-site or on-site hauling. Approximately 390 acres of the 438-acre project site would be cleared and graded for construction and placement of the solar panels, gravel access roads, and accompanying electrical components (including the new substation) within the fenced-in area. Existing bunkers, buildings, and other structures on the project site will be demolished for construction of the solar facility. The existing farm pond would be drained, filled, and graded to accommodate the solar panels. Prior to clearing and grading activities, buffers in accordance with Tennessee requirements (a minimum of 30 feet in width) would be established along the streams and unaffected wetlands as a conservative avoidance measure, and these areas would be avoided during construction to the extent possible, although minimal work could occur within the buffer zones (Figure 3).

Once sensitive areas are marked, construction areas would be cleared and mowed of vegetation and miscellaneous debris. Ongoing mowing would continue as needed, to contain growth during construction and limit clearing to the maximum extent.

To manage storm water during construction, on-site temporary sedimentation basins, sediment traps, and diversion berms would be constructed within the 390-acre fenced-in area of solar

arrays and access roads. The berm would be along the perimeter of the site to contain storm water on site. Sedimentation basins and traps would be compliant with TDEC requirements. Three sedimentation basins and two traps would be constructed and would drain a total disturbed area of approximately 73 acres. The basins would be constructed either by impoundment of a natural depression(s) or by excavating the existing soil. The floor and embankments of the basins would be allowed to naturally reestablish native vegetation after construction (or replanted as necessary) to provide natural stabilization, minimizing subsequent erosion. Water from the basins would be released into adjacent ditches. The breached basins would remain in place after construction.

Construction would be sequenced to minimize the exposure time of the disturbed areas. Silt fence would surround the site perimeter, including any ditches and sedimentation basins. Other appropriate controls such as temporary cover would be used as needed to minimize exposure of soil and to prevent eroded soil from leaving the work area. Disturbed areas including but not limited to road shoulders, office/laydown areas, ditch areas, and other project-specific locations would be seeded post-construction. If conditions require, soil would be stabilized by mulch or sprayable fiber mat. If the area seeded is a steep slope (6:1 or greater), hydroseeding may be employed as an alternative. Where hay mulch is required, it would be applied at 3 tons per acre, well-distributed over the area. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is stable. The SWPPP for the project area would be finalized with the final grading/civil design prior to construction.

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage during construction. This area would be on site for the duration of construction. Temporary construction trailers used for material storage and office space would be parked on site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. No operations and maintenance buildings or other permanent structures would be on site.

Solar panels would be manufactured off site and shipped to the site ready for installation. If concrete pads are required for the drive motors they would be precast and brought to the site via flatbed truck. Once the majority of the components are placed on their respective foundations and structures, electricians and helpers would run the electrical cabling throughout the solar field.

After the equipment is electrically connected, electrical service would be tested, motors checked, and control logic verified. As the solar arrays are installed, the balance of the facility would continue to be constructed and installed and the instrumentation would be installed. Once all of the individual systems have been tested, integrated testing of the Project would occur.

The design of the tracker support structures could vary depending on the final PV technology and vendor selected. Typical installations of this type are constructed using steel support piles. The driven steel pile foundation is typically galvanized and used where high load bearing capacities are required. The pile is driven with a hydraulic ram. Soil disturbance is restricted to the pile insertion location with temporary disturbance from the hydraulic ram machinery, which is

about the size of a small tractor. Screw piles are another option for PV foundations which are driven into the ground with a truck-mounted auger. Screw piles create a similar soil disturbance footprint as driven piles.

The Proposed Action includes a new substation on the eastern side of the project site adjacent to Bethuel Road (Figure 3) that would connect to the TVA network. Electrical system/interconnection details are provided in Section 2.2.3 below.

SR Millington, LLC would construct a 161-kV substation at the corner of Kerrville Rosemark Road and Bethuel Road. The new substation would be 150 feet wide by 170 feet long and would occupy approximately 0.60 acre within the project site and would be secured by a 7-foot-tall fence within the overall site security fencing. The fence surrounding the substation would be a 6-foot-tall chain link fence with 3 strands of barb totaling 1 foot on top. A concrete foundation would support the substation and would likely be installed with trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. For personnel safety and equipment protection during fault conditions (abnormal electric current), a ground grid would be installed in the area. This would consist of appropriately sized conductors meshed and buried below ground. Each piece of equipment and supporting structure within the substation would be electrically connected to the ground grid in accordance with the requirements of Institute of Electrical and Electronics Engineers Standard 80. The substation would have lighting controlled by a switch. Lights would normally remain off unless personnel were present. The light would be focused on areas of heavy traffic such as entrances, as well as major equipment for maintenance purposes.

The perimeter of the 390-acre solar facility would be securely fenced during construction and for the duration of the Project operation with 7-foot-tall fencing. The 6-foot tall chain-link perimeter fence would be topped with 3 strands of barbed wire totaling 1 foot. Access into the project site would be provided by double-swing gates and access roads. Gates would be on Bethuel Road adjacent to the new on-site substation, at the southern boundary by Attu Extended, and in the northwestern corner of the project site and will be locked to prevent unauthorized access to the site. The site would be accessible only to SRC, SR Millington, LLC, and its agents and contractors. Construction activities would take approximately 15 months to complete using a crew that ranges from 150 to 200 workers at the peak of construction. Work would generally occur 7 days a week from 7 A.M to 5:00 P.M. during the winter and 3:00 A.M to 2:00 P.M. during the summer. Activities occurring before sunrise would likely be inside the construction trailer, so no lighting would be needed on the project site. Additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities.

2.2.3 Electrical Interconnection

Under the Proposed Action, SR Millington, LLC would construct a small substation on the project site. The 161-kV substation would combine all the AC power from the collection circuits and increase its voltage to match the voltage of the connecting transmission line. This substation would consist of two 161-kV power circuit breakers, one 12.47-kV power circuit breaker, four 34.5-kV circuit breakers, one 12.47-kV grounding transformer, one main step-up 161-kV transformer, one 34.5-kV capacitor bank, one 161-kV disconnect switch, one 161-kV

line switch provided by TVA, three 161-kV line side capacitor voltage transformers (CCVTs, or step-down transformers), and a control enclosure. The prefabricated control enclosure would measure 15 feet wide by 26 feet long and would house the protection and control equipment, metering equipment, automation relay panels, and communication equipment. Aboveground and below-ground conduits from the substation equipment would connect to the control enclosure.

SR Millington, LLC would install and maintain 17 three-phase transformers associated with each inverter at the solar facility that would convert the solar facility output to 53 MW AC. These transformers would be connected to the substation through buried electrical cables. SR Millington, LLC and TVA would install meters at the new substation for the new 12.47-kV distribution line and 161-kV transmission line. After the final voltage step-up at the substation, the Project would be interconnected to the proposed 161-kV TVA transmission line to connect to the electrical system. SR Millington, LLC would sell the entire project output (53 MW AC) from the solar facility, including the output from the naval portion, to TVA.

2.2.3.1 Transmission Line

Under the Proposed Action, TVA would construct an approximately 4.9-mile-long 161-kV transmission line, called the Shelby-Millington Solar 161-kV Transmission Line, to connect the Millington Solar Facility's 161-kV substation to TVA's existing nearby Shelby-Drummonds 161-kV Transmission Line. The preferred route of the new transmission line is shown on Figure 6.

From the Millington Solar Facility's substation on Bethuel Road, the preferred route of the new transmission line would parallel Center College Road for approximately 0.75 mile and then continue approximately 1.25 miles through predominantly crop and pastureland. The route would then turn north approximately 2.5 miles to the existing Shelby-Drummonds 161-kV Transmission Line, which connects to the Shelby 500-kV Substation, approximately 0.5 mile north of Mudville Road (Figure 6). The proposed transmission line would be single circuit supported by steel poles and constructed on a 100-foot wide ROW.

To facilitate the operation of the proposed site and transmission line connection, TVA proposes to also undertake the following additional activities:

- Installation of fiber-optic overhead groundwire (OPGW) along the length of the new transmission line
- Installation of line switches inside the Millington Solar Facility 161-kV substation
- Installation of a switch structure at the connection to the Shelby-Drummonds 161-kV Transmission Line
- Addition of communication equipment to the Millington Solar Facility's 161-kV substation and modifications to the communications equipment at the Shelby 500-kV Substation
- Modification of TVA system map boards to include names and numbers of the new transmission line and Millington Solar Facility's 161-kV substation

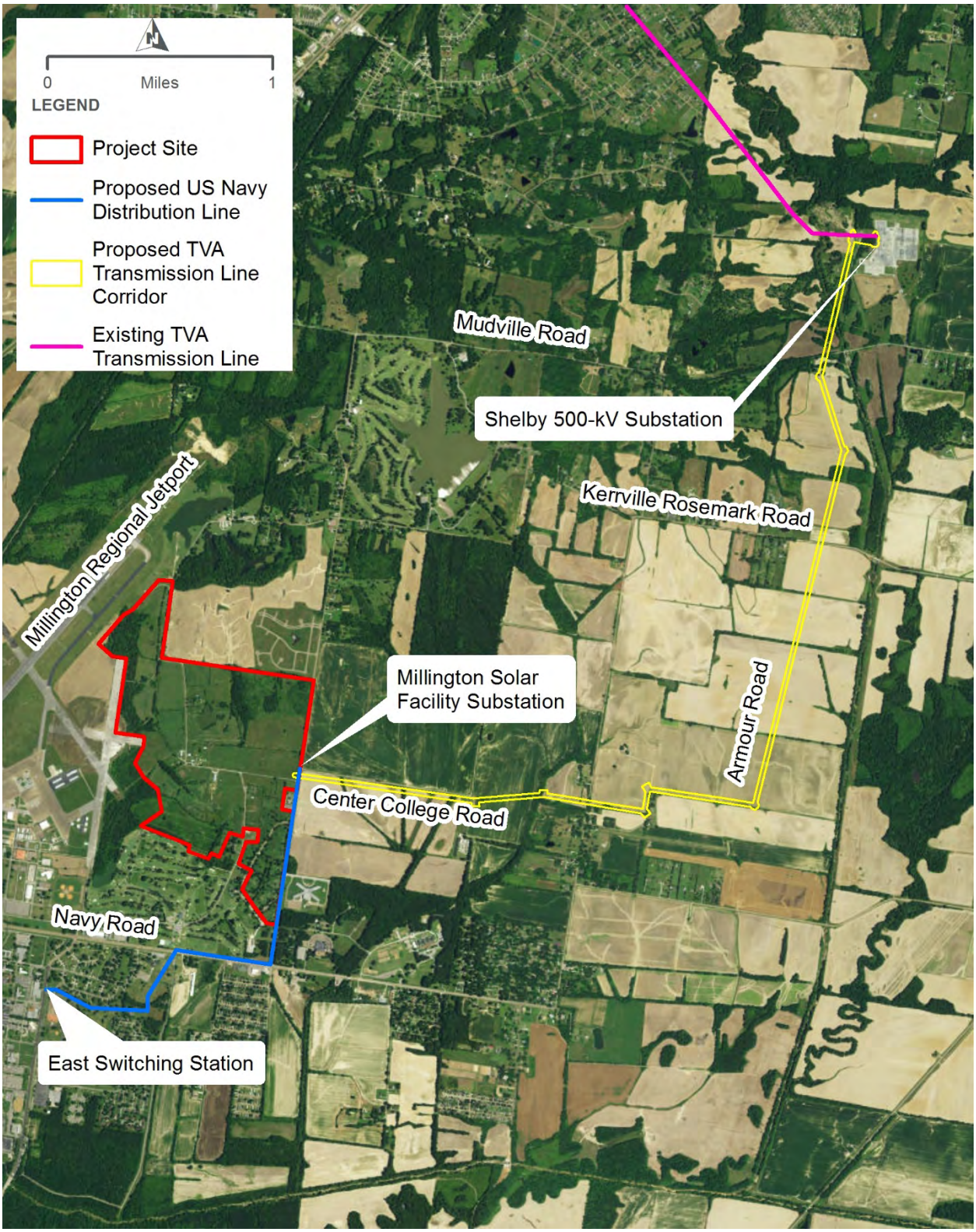

Figure 6. Preferred path of proposed TVA and Navy electrical lines connecting to the Millington Solar Facility.

Right-of-Way Acquisition and Clearing

TVA typically purchases easements for new transmission line ROWs from landowners; these easements give TVA the right to construct, operate, and maintain the transmission line, as well as remove "danger trees" adjacent to the ROW. Danger trees include any trees that are located beyond the cleared ROW, but that are tall enough to potentially impact a transmission line structure or conductor, should the trees fall toward the transmission line. 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 transmission line or create a hazardous situation.

Because the area in which the proposed transmission line would be built is predominantly unforested, limited clearing would be required. Trees and shrubs would be removed from the ROW in areas where clearing is needed to maintain adequate clearance between tall vegetation and transmission line conductors and to provide access for construction equipment. Equipment used during this ROW clearing may include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Woody debris and other vegetation would be piled and burned, chipped, or taken off-site. 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 hand-held equipment or remote-handling equipment, such as a feller-buncher, in order to limit ground disturbance. *TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, Transmission Construction Guidelines Near Streams, Environmental Quality Protection Specifications for Transmission Substation or Communications Construction* (Appendices A, B, C, and D), and *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Revision 3 – 2017* (TVA 2017a) would provide guidance for clearing and construction activities.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable, utilizing appropriate seed mixtures as described in TVA (2017a), or in working with the property owner to establish desired crop cover. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices A, B and C, and in TVA (2017a). Native vegetation with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction and low mature heights would be maintained within the ROW following construction.

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. Information on access road siting is not available at this time and additional (supplemental NEPA) analysis would be conducted if

additional environmental resources are affected. 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 permanent streams would be removed following construction. However, in ephemeral streams (also known as wet weather conveyances or streams that only flow following a rainfall) 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*.

Transmission Line Construction

Transmission-related project features would be accessed using existing roads to the extent possible. Access roads, as described above, would be needed to allow vehicular access to each structure and other points along the ROW during construction.

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage during construction. This area would be on the Millington Solar Facility site, if available, or leased from a private landowner for the duration of the construction period. Trailers used for material storage and office space would be parked at the construction assembly site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner. The proposed transmission line would utilize single steel-pole structures. Examples of these structure types are shown in Photo 1. Structure heights would vary according to the terrain, but would range between 50 and 120 feet above ground.

Photo 1. Typical single pole structure

Photo 2. Example of switch structure

A switch structure (Photo 2) would be installed at the junction of the new line and the Shelby-Drummonds line. The switch structure would be lattice-steel structures between 35 and 50 feet tall. Three conductors (the cables that carry the electrical current) are required to make up a single-circuit alternating current transmission line. Each conductor would be attached to a porcelain insulator suspended from the structure cross arm. A smaller overhead ground wire containing fiber optic communication cables would be attached to the top of the structures.

Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used. Poles at angles (angle points) in the transmission line would be self-supporting or require supporting screw, rock, or log anchored guys.

Equipment used during the construction phase would include trucks, truck-mounted augers, and drills, 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.

Reels of conductor and OPGW would be delivered to the site. A small rope would be pulled from structure to structure. It would be connected to the conductor and used to pull it down the line through pulleys suspended from the insulators from pull-points along the ROW. 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. The OHGW would be installed in a similar manner.

Transmission Line Operation and Maintenance

Periodic inspections of transmission lines are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are also performed in order to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management. TVA vegetation management standards, based on National Electric Safety Code requirements, require a minimum vegetation clearance of 24 feet for 161-kV transmission lines. Vegetation management along the ROW would consist of the felling of danger trees adjacent to the cleared ROW (as described in the ROW Acquisition and Clearing Section) and vegetation control within the cleared ROW. These activities occur on approximately 3- to 5-year cycles. TVA utilizes an integrated management approach for its ROW vegetation management that is designed to encourage low growing plant species and discourage tall-growing plant species. A vegetation reclearing plan is developed for the transmission line, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy

growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied by helicopter or from the ground with backpack sprayers or vehicle-mounted sprayers. Provided the current agricultural land use continues, little ROW maintenance would be required in the future.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the U.S. Environmental Protection Agency (USEPA) are used. A list of the herbicides currently used by TVA in ROW management is presented in Appendix E. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available. Other than vegetation management, little maintenance work is generally required. The transmission line structures and other components typically last several decades.

Transmission Line Siting Process

Four alternative transmission line routes consisting of ten alternative segments were considered, but eliminated from further consideration. TVA evaluated each transmission line route using social, engineering, and environmental factors. Information sources included available data, aerial photography, limited on-site reviews, public review and comment, and property owner input (TVA 2017b).

The process of siting the proposed transmission line followed the basic steps used by TVA to determine a transmission line route. These include the following:

- Determine the potential existing transmission assets to connect to
- Define the study area
- Collect data to minimize potential impacts to social, engineering, and environmental (cultural and natural) features
- Identify general route segments producing potential routes
- Gather public input
- Analyze route alternatives incorporating public input
- Define the proposed transmission line route.

Definition of the Transmission Line Study Area

The first task in defining the study area for the transmission line was to identify an existing TVA transmission asset that the Millington Solar Facility could connect to. TVA's existing Shelby-Drummonds 161-kV Transmission Line was the most practical asset because it is the closest to the Millington Solar Facility.

The study area was determined primarily by the location of the Millington Solar Facility and the locations of existing power system assets, along with development and geographic features that provide natural boundaries for consideration. The northern boundary was set along the existing transmission line connection (Shelby-Drummonds 161-kV Transmission Line) and Shelby 500-kV Substation. The boundary to the east was defined by the presence of Big Creek Canal. The boundary to the south is marked by the Millington Solar Facility and the boundary to the west by both residential and commercial development as well as pivot irrigation.

Data Collection

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

Additionally, TVA used aerial color orthophotography of the study area. These images were geo-referenced to produce an accurate image of the Earth by removing the distortions caused by camera tilt and topographic relief displacements, and then digitized for use in the GIS. This aerial photography was then interpreted to obtain land use and land cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries.

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

Calculations from aerial photographs, tax maps, and other sources included, but were not limited to, the number of road crossings, stream crossings, and property parcels. The aerial photography, GIS-based map, and other maps and drawings were supplemented by reconnaissance throughout the study area by TVA personnel.

Establishment and Application of Siting Criteria

TVA uses a set of evaluation criteria that represent opportunities and constraints for development of alternative transmission and distribution line routes. These criteria include social, engineering, and environmental factors such as existing land use, ownership patterns, environmental features, terrain, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations, materials, and ROW acquisition costs being the most important elements. Identifying feasible transmission line routes involves weighing and balancing these criteria.

- Engineering and constructability criteria include considerations such as terrain (steeper slopes can present major challenges for design and construction), total length of the transmission line, number of primary and secondary road crossings, accessibility, the presence of pipeline and transmission line crossings, and total transmission line cost.

- Social criteria include the total acreage of new ROW, number of affected property parcels, issues raised in public comments, consideration of visual aesthetics, and proximity to schools, houses, commercial or industrial buildings, and barns.

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

Analysis of these criteria aid in evaluating the impacts on engineering, social, and environmental resources based on the data available at this stage in the siting process.

Characterization of Preferred Alternative

TVA announced the preferred route as "Route 4" in spring 2017. This route ranked best overall in environmental and engineering constructability criteria and slightly lower in social criteria. The preferred route occupies approximately 60 acres and is 4.88 miles in length, 3.55 miles of which are adjacent to an existing transmission line. No intrastate, pipeline, or railroad crossings are associated with the preferred alternative route. No homes, churches, cemeteries, or businesses are located within the proposed ROW. Preliminary analysis of desktop resources discussed in the Data Collection section resulted in the characterization of this route as occupying 2.6 acres of forestland, 0.4 acre of which is interpreted as forested wetland, and crossing five ephemeral or intermittent streams and two perennial resources. No known occurrences of caves, threatened or endangered species, or recorded archeological or historic sites are within the proposed ROW. Environmental field surveys were conducted in August 2017 and the results are discussed in Chapter 3.

2.2.3.2 Distribution Line

Under the Proposed Action, SR Millington, LLC would construct an approximately 2-mile-long overhead three-phase 12.47-kV IKC distribution line (express feeder) to connect from Millington Solar Facility's 161-kV substation to NSA Mid-South's East Switching Station, approximately 0.25 mile south of Navy Road. The proposed distribution line would be composed of wooden poles and be constructed within a 50-foot-wide corridor. From the on-site substation, the new distribution line would continue south approximately 0.85 mile along Bethuel Road to Navy Road, parallel the north side of Navy Road for approximately 0.5 mile, and then cross Navy Road underground and continue southwest approximately 0.25 mile around military housing and terminate at Singleton Avenue at the Mid-South's East Switching Station (Figure 7).

The new overhead line and poles would be located within the existing Bethuel Road roadway ROW on the west side of the road and would be installed parallel to the road and independent of the existing line that is on the east side of the road. Along Navy Road, the new line would be on existing roadway ROW parallel to the south side of the road and the existing line that is on the south side of the road. South of Navy Road, the new line would be located entirely on Navy property on existing utility easement and predominantly undeveloped land. No new easements

or ROW would be required. No alterations or upgrades to existing lines would be required, but upgrades to existing NSA switching stations, including the East Switching Station and West Switching Station, would be required to reconfigure and accept the new distribution line. Two new breakers will be installed in existing bay positions at the East Switching Station and the new distribution line would terminate at the new breakers.

Distribution Line Construction, Operation and Maintenance

The new IKC distribution line would parallel Bethuel Road and could be accessed from the existing roadside easements/ROW; therefore, no new access roads would be required. The remaining portion of the new distribution line south of Navy Road would be within the existing Navy Road ROW and on Navy property and would be owned and maintained by the Navy. All poles would need to be accessible to a bucket truck and a derrick digger truck for maintenance. Some tree trimming may be required on the solar facility site outside the fenced-in area, along Bethuel Road, and in very small sections south of Navy Road for the new distribution line, but the cleared roadside ROWs are sufficiently wide to accommodate the new line. The new wooden poles would be installed within existing roadside ROW and utility easements and outside of streams or wetlands. The new distribution line would be supported by single wooden poles approximately 40 to 50 feet tall. Most poles would be directly embedded in holes augured into the ground to a depth of 6 to 8 feet. Normally, the holes for the wooden poles would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel mixture would be used.

The distribution line would be underground at its crossing of Navy Road and would be installed by directional boring. The minimum burial depth to the top of the conduit encasing the underground line would be 3 feet, but may be deeper as required by the permitting agency and/or for clearance to underground obstructions (water, sewer, storm sewer, etc.). The disturbance area for the proposed line would be 25 feet on each side of the poles, for a total corridor width of 50 feet.

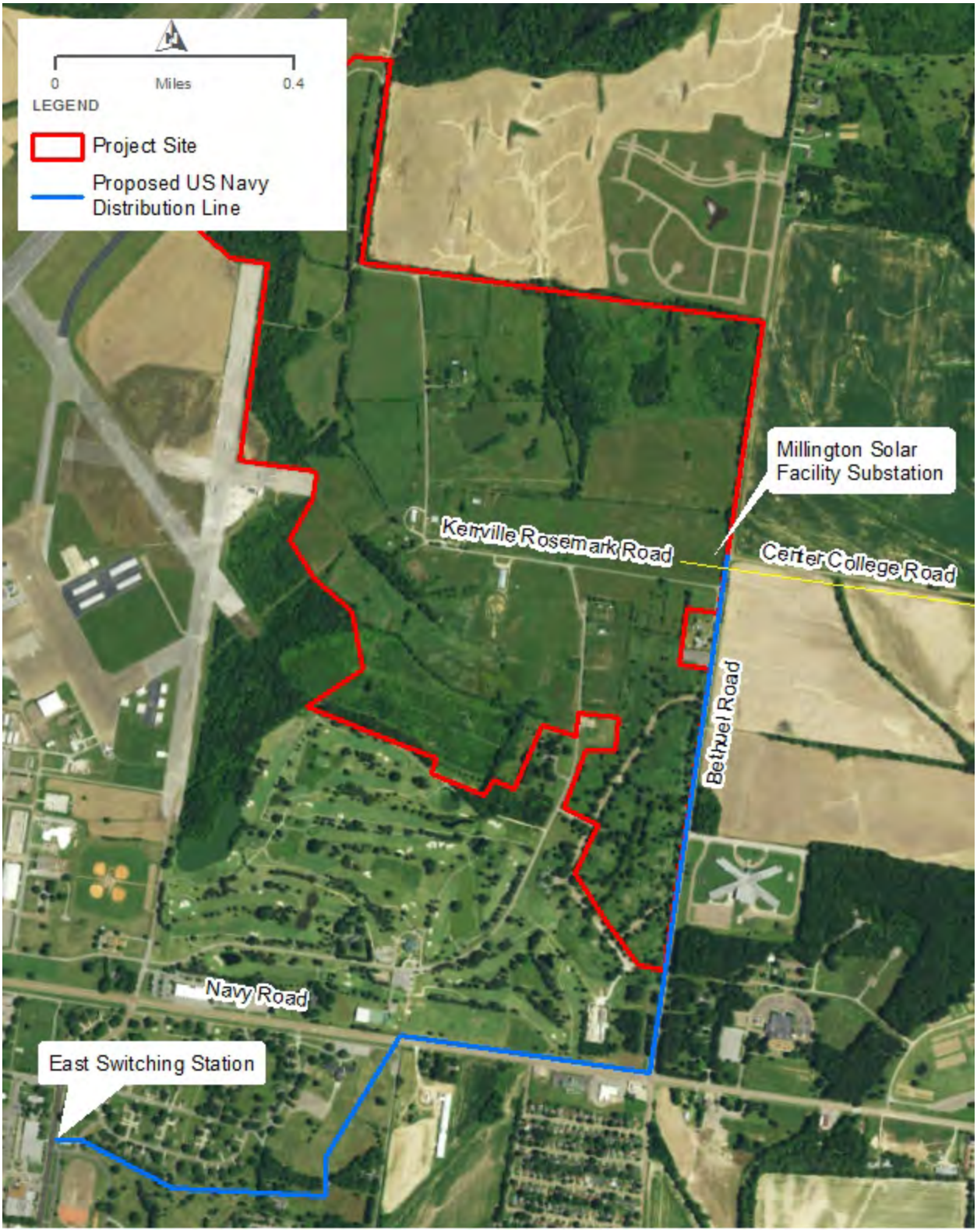

Figure 7. Location of proposed Navy distribution line connecting to NSA Mid-South's East Switching Station.

A construction assembly area (laydown area) would be required for the distribution line equipment including poles, crossarms, insulators, associated hardware, and underground cable and conductor reels. This would be the same area used for the transmission line construction and would likely be on the Millington Solar Facility site and would be approximately 200 feet by 50 feet (10,000 square feet) in size. Equipment used during the construction phase would include trucks, truck-mounted augers, and drills, as well as tracked cranes and bulldozers.

Periodic inspection and maintenance of the connecting distribution line after operation would be the responsibility of the Navy. Routine maintenance activities would include tree trimming, mechanical mowing or application of herbicides. Any herbicides used would be applied in accordance with applicable state and federal laws and regulations. Other than vegetation management, little maintenance work is generally required.

Distribution Line Siting

Two distribution line routes were considered and one route was eliminated. SR Millington, LLC and the U.S Navy evaluated each route using social, engineering, and environmental factors. The original route (Route 1) followed along Navy Road directly to Singleton Avenue and then followed Singleton Avenue south to the switching station. The original "Route 1" was adjusted in April 2017 and "Route 2" was proposed after discussions with Navy personnel and a site visit due to several factors:

- The initial Route 1 overhead line was proposed parallel to Navy Road and McCain Street. However, this area is already occupied by a Memphis Light, Gas, and Water line, which would make the design of another line in that area difficult. The area that the proposed Route 2 would occupy is much less congested.
- Route 2 would allow SR Millington, LLC to keep the distribution line outside the Navy housing area. The area has underground utilities, and placing overhead lines through that area would not be aesthetically pleasing.
- Route 1 was an indirect route that would require the use of either guyed or self-supporting poles, which would increase the project cost and affect aesthetics of the structures. Route 2 is a more direct route that would allow the use of tangent structures, which are more economical and provide a straightforward design.

2.2.4 Project Operations

During operation of the solar facility, no major physical disturbance would occur. Moving parts of the solar field would be restricted to the east-to-west facing tracking motion of the solar modules, which amounts to a movement of less than a 1 degree angle every few minutes (barely perceptible). In the late afternoon, module rotation would start to backtrack to minimize shading in a similar slow motion. At sunset the modules would track to a flat stow position. Otherwise, the PV modules would simply collect solar energy and transmit it to the TVA power grid. With the exception of fence repair, vegetation control, and periodic array inspection, repairs, and maintenance, the facility would be relatively undisturbed during operation. No water or sewer service, or permanent lighting would be required on site during operations.

The project site would not be manned during operation; however, inspection and maintenance is required biannually and for equipment failures. Biannual inspections would include identifying any physical damage of panels, wiring, and interconnection equipment and drawing transformer oil samples. Vegetation on the site would be maintained to control growth and prevent overshadowing or shading of the PV panels. Traditional trimming and mowing would be performed on a quarterly basis (generally every 3 months), depending on growth rate to maintain the vegetation. During operations, selective use of spot herbicides may also be employed around structures to control invasive weed outbreak, if encountered. Any herbicides used on the U.S. Navy's 72 acre parcel will be coordinated with NSA Mid-South Public Works Environmental. Precipitation in this region is adequate to remove dust and other debris from the PV panels while maintaining energy production; therefore manual panel washing is not anticipated unless a specific issue is identified.

In addition to the periodic maintenance, the proposed solar facility would be monitored remotely to identify any security or operational issues. If a problem is discovered during nonworking hours, a repair crew or law enforcement personnel would be contacted if an immediate response were warranted.

2.2.5 Decommissioning and Reclamation

The Project would operate and sell power under a PPA with TVA for the first 20 years of its life. At the end of the PPA, the Project staff and SR Millington, LLC would assess whether to cease operations at the project site or to replace equipment and attempt to enter into a new power purchase contract or other arrangement. If TVA or another entity is willing to enter into such an agreement, the Project could continue operating. If no commercial arrangement is possible, then the facility would be decommissioned and dismantled and the site restored. In general, the majority of decommissioned equipment and materials would be recycled. Materials that cannot be recycled would be disposed of at an approved facility. SR Millington, LLC owns the majority of the land for the Project, and the lease with the Navy is for 37 years, so site control would be maintained longer than the 20 year PPA period. SR Millington, LLC would likely renegotiate further PPA terms since the PV panels are warrantied for longer than the 20-year period. It is likely that the solar facility would be in operation for 25 to 30 total years.

2.3 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

In determining the suitability for development of a site within TVA's service area that would meet the goals of expanding TVA's renewable energy portfolio as expressed in the IRP, multiple factors were considered to screen potential locations and ultimately eliminate those sites that did not provide the needed attributes. This process of review and refinement ultimately led to the consideration of the current project site.

The site screening process consisted of general solar resource screening within TVA's service area including ensuring the availability of nearby electric infrastructure for interconnection. Additional screening consisted of suitable large-scale landscape features that would allow for utility scale solar development such as:

- Generally flat landscape with minimal slope, with preference given to disturbed contiguous land with no on-site infrastructure or existing tall infrastructure in the immediate vicinity;
- Land having sound geology for construction suitability, with minimal and/or avoidable floodplains or large forested or wetland areas;
- Ability to avoid and/or minimize impacts to known sensitive biological, visual and cultural resources.

SR Millington, LLC considered agricultural (cropland) sites adjacent to the east side of Bethuel Road for the proposed solar facility site; however, TVA's RFP required applicants use the Navy's land (approximately 72 acres) and the adjacent MIDB land (approximately 330 acres) for the solar facility. SR Millington, LLC expanded the site to the northwest to include an additional 37 acres in the project area. The RFP stated that the full utilization of the 72 acres of Navy property must be developed and requested that the naval land be developed before the adjoining MIDB property. SR Millington, LLC considered several site layout designs within the selected parcels to maximize use of space while minimizing impacts to wetlands, streams, and other resources.

The siting process and consideration for alternative routes for the proposed transmission line and distribution line are described in detail in Section 2.2.3.1 and Section 2.2.3.2.

2.4 COMPARISON OF ALTERNATIVES

This EA evaluates the potential environmental effects that could result from implementing the No Action Alternative or the Proposed Action Alternative at the proposed solar site in Shelby County, Tennessee. The analysis of impacts in this EA is based on the current and potential future conditions on the properties and within the surrounding region. A comparison of the impacts of the alternatives is provided in Table 1.

2.5 IDENTIFICATION OF BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

SR Millington, LLC would employ appropriate BMPs, including those required by permits, and adherence to the SWPPP, and specific mitigation measures when constructing and operating the solar facility, 12.47-kV distribution line, and associated easements and access roads.

BMPs include:

- Streams and wetlands on site would be protected by the use buffers in accordance with state requirements to minimize direct and indirect impacts.
- Herbicides would be used selectively to restrict applications near receiving waters and minimize adverse impacts on water quality.
- The introduction and spread of invasive species would be minimized by revegetating with native noninvasive species.

Mitigation measures include:

- To mitigate for the proposed impacts to waters of the U.S., SR Millington, LLC proposes to purchase mitigation credits from the Tennessee Wildlife Federation (TWF) in-lieu fee program at a 2:1 ratio for project impacts at a cost of $20,000.
- Should traffic flow be a problem, SR Millington, LLC would consider staggered work shifts to space out the flow of traffic to and from the project site. SR Millington, LLC would also consider posting a flag person during the heavy commute periods to manage traffic flow and to prioritize access for local residents.

TVA employs standard practices when constructing, operating, and maintaining transmission lines, structures, and the associated ROW and access roads. These can be found on TVA's transmission website (TVA 2017b). Some of the more specific routine measures that would be applied to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed transmission line and access roads are as follows:

- TVA would utilize standard BMPs, as described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Revision 3* (TVA 2017a) , and TDEC's *Erosion & Sediment Control Handbook* (TDEC 2012) 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 E.O. 13112 (Invasive Species) for revegetating with noninvasive plant species as defined in TVA (2017a).
- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in TVA (2017a) and TDEC's Erosion & Sediment Control Handbook (TDEC 2012).
- Perennial and intermittent streams would be protected by the implementation of Standard Stream Protection (Category A), Protection of Important Steams, Springs, and Sinkholes (Category B), or Protection of Unique Habitat (Category C) as defined in TVA (2017a).
- 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 transmission line location in floodplains
    - Construction or improvement of access roads would be done in such a manner that upstream flood elevations would not be increased

- 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.

Table 1. Comparisons of impacts by alternative.

Resource area	Impacts from the No Action Alternative (status quo)	Impacts from Proposed Action Alternative
Land Use	No direct impacts anticipated. Indirect impacts are possible as undeveloped land and general industrial and commercial land is utilized for residential or other development over the long term.	Minor direct adverse impacts. Land use on the project site would change from predominantly pasture to industrial. The surrounding area, however, is largely agricultural, undeveloped and residential, which would not change. No indirect impacts.
Geologic Resources and Prime Farmlands	No direct or indirect impacts anticipated.	Minor negative impacts related to erosion and sedimentation. Minor negative impacts due to conversion of 87.6 percent of prime farmland. No indirect impacts anticipated.
Water Resources	No direct or indirect impacts anticipated.	**Groundwater**: No direct adverse impacts anticipated. Potential minor beneficial impacts from reducing fertilizer and pesticide runoff entering groundwater. **Surface Water:** No permanent direct adverse impacts to streams. Minor temporary direct adverse impacts (less than 5 linear feet along jurisdictional stream) during construction due to trenching and with the use of BMPs. Potential minor beneficial impacts from reducing fertilizer and herbicide runoff entering surface waters. **Floodplain:** No direct or indirect impacts anticipated. **Wetlands:** Minor permanent direct impacts (approximately 0.001 acre) to jurisdictional wetlands due to placement of pilings. Minor temporary impacts to approximately 2.0 acres of jurisdictional wetlands due to clearing for transmission line spans. Minor temporary direct adverse impacts during construction due to trenching and use of BMPs.

Resource area	Impacts from the No Action Alternative (status quo)	Impacts from Proposed Action Alternative
Biological Resources	No direct impacts anticipated. Potential indirect impacts if current human practices are continued.	**Vegetation:** Minor direct and indirect adverse impacts associated with the clearing and grading of vegetation. **Wildlife:** Minor direct and indirect adverse impacts associated with displacement of wildlife during site clearing and grading and conversion of small forested areas of site to permanent grass-herbaceous vegetation cover. **Rare, Threatened & Endangered (T&E) Species:** No effects to federally listed species. No adverse effects to state-listed species.
Visual Resources	No direct or indirect impacts anticipated.	Minor temporary direct and indirect adverse impacts during construction related to vegetation removal and use of heavy equipment. Moderate direct visual impacts in the immediate area, minor direct impacts over a larger scale.
Noise	No direct or indirect impacts anticipated.	Minor temporary direct and indirect adverse impacts during construction. Negligible adverse impacts associated with operation.
Air Quality and Greenhouse Gas Emissions	No direct or indirect impacts anticipated.	Minor temporary adverse impacts during construction. Minor beneficial impacts from operation due to a potential decrease in overall pollutant emissions.
Cultural Resources	No direct or indirect impacts anticipated.	No direct or indirect impacts anticipated.
Utilities	No direct or indirect impacts anticipated.	No direct or indirect adverse impacts anticipated. Beneficial direct impacts to electrical services and energy reliability to NSA Mid-South due to additional renewable services in the region.
Waste Management	No direct or indirect impacts anticipated.	No significant direct or indirect adverse impacts anticipated with the use of BMPs.
Public and Occupational Health and Safety	No direct or indirect impacts anticipated.	Minor temporary adverse impacts during construction. No public health or safety hazards as a result of operations.
Transportation	No direct or indirect impacts anticipated.	Minor temporary direct adverse impacts during construction. No indirect impacts anticipated. Minor permanent direct impacts to local roads through site.

Resource area	Impacts from the No Action Alternative (status quo)	Impacts from Proposed Action Alternative
Socioeconomics	No direct or indirect impacts anticipated.	Moderate positive and long-term direct impacts from construction and operation of the Project. The local tax base would increase from construction of the solar facility and would be most beneficial to the City of Millington.
Environmental Justice	No direct or indirect impacts anticipated.	No direct or indirect impacts anticipated.

2.6 THE PREFERRED ALTERNATIVE

TVA's preferred alternative for fulfilling its purpose and need is the Proposed Action Alternative. This alternative would generate renewable energy for TVA and its customers with only minor direct and indirect environmental impacts, would help meet TVA's renewable energy goals, and would help TVA meet future energy demands on the TVA system.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environmental, social, and economic conditions of the proposed Project and the surrounding areas that might be affected if the No Action or Proposed Action Alternative is implemented. This chapter also describes the potential environmental effects that could result from implementing the No Action or Proposed Action Alternative.

3.1 LAND USE

This section describes an overview of existing land use at and surrounding the project site and potential impacts to land use associated with the No Action and Proposed Action Alternatives. The project area is located in Millington, Tennessee located in Shelby County (Figure 1).

3.1.1 Affected Environment

Land use is defined as the way people use and develop land, including uses designated as undeveloped, hay/pasture, residential, and industrial. Many municipalities develop zoning ordinances and planning documents to control the direction of development and to keep similar land uses together. The project area is located within the jurisdiction of the City of Millington, Tennessee Planning and Zoning Department. Currently the majority of the project site is zoned M-2, General Industrial, with a section on the eastern portion zoned B-2, General Commercial. Images generated with the National Land Cover mapping tool show the project site as primarily cultivated crops and hay/pasture use (Figure 8).

The portion of the project site that is leased from the Navy (approximately 72 acres) was formerly part of the NSA Mid-South facility and was previously known as the U.S. Naval Air Station (NAS) Memphis, which was closed in 1999 during Defense Base Realignment and Closure (BRAC). The 1993 BRAC Commission recommended realignment of the U.S. NAS Memphis and the disposal of all property not required to support continuing nonairfield related operational commitments, including the area now proposed for the solar facility (Department of Defense 1999). The portion of the project site (approximately 366 acres) that is presently owned by SRC (and would be leased by SR Millington, LLC) was also previously owned by the. Navy as part of the former U.S. NAS Memphis and was transferred in 1999 during BRAC to MIDB. A majority of the surplus U.S. NAS Memphis property transferred to MIDB for the BRAC process would be devoted to industrial business and airfield uses and would support the actual airport operations and be developed for a variety of business uses (Department of Defense 1999). MIDB subsequently sold the land to SRC in 2016 for the proposed solar facility because it was a benefit for the community and in line with the community goals after BRAC.

The majority of the project site is fallow pastureland containing dirt and paved roads, various structures providing agricultural support, and multiple former horse corrals and stables. Grazing and farming last occurred on the project site at least 5 years ago and the site is mowed approximately three times per year to comply with MIDB requirements. The majority (approximately 51 acres) of the naval land is classified on land cover maps as predominantly

(previously) low-intensity developed and consists of paved roads, mature landscaped trees, and demolished naval base housing. Fallow pastureland and narrow treelines make up the remaining approximately 21 acres of the naval land. The SRC-owned tract is predominantly fallow pastureland and small forested areas.

Kerrville Rosemark Road intersects Bethuel Road in the east-central portion of the project site and continues through the central portion of the project site, before turning north and looping back to Bethuel Road again north of the project site. A manmade pond and several wet weather conveyances are present within the project site. The project site consists of flat terrain with a few scattered depressions and ranges in elevation from approximately 285 to 350 feet above mean sea level (amsl) with the topography gradually sloping towards the south. Several small stands of shrubs and trees are present across the site, primarily along the western edge of the project site. Topography is highest on the northwest portion of the project site, decreasing towards wetlands in the southern section.

The property immediately adjacent to the western border of the site is the Millington Regional Jetport (NQA) which supports an 8,000 foot runway. The Glen Eagle Golf Course is located on naval property south of the project site and is open to the public. Cultivated croplands are located to the east and north, with the northern adjacent property zoned for a low density residential development. The northern adjacent property was previously planned to be used for naval housing and then the development ceased and was moved south of Navy Road. The Navy has no plans to commence construction of homes on the property and it is currently owned by Millington Realty Partners I LP. Bethuel Road is the eastern boundary of most of the site, with narrow treelines along portions of the road and one residence that is encompassed on three sides by the project site. The NSA Mid-South facility is south of the golf course, on the south side of Navy Road. Millington Elementary School is east of the project site, on the east side of Bethuel Road across from the southeastern corner of the project site. The proposed distribution line crosses primarily agricultural land within an existing utility easement.

The proposed transmission line passes through primarily open land that is used primarily for agricultural purposes. Other than the golf course there are no formal public outdoor recreation areas in the immediate vicinity of the project and the project area likely receives little to no dispersed outdoor recreation use.

The closest populated area is Millington, Tennessee, a city with approximately 10,000 residents (U.S. Census Bureau [USCB] 2010).

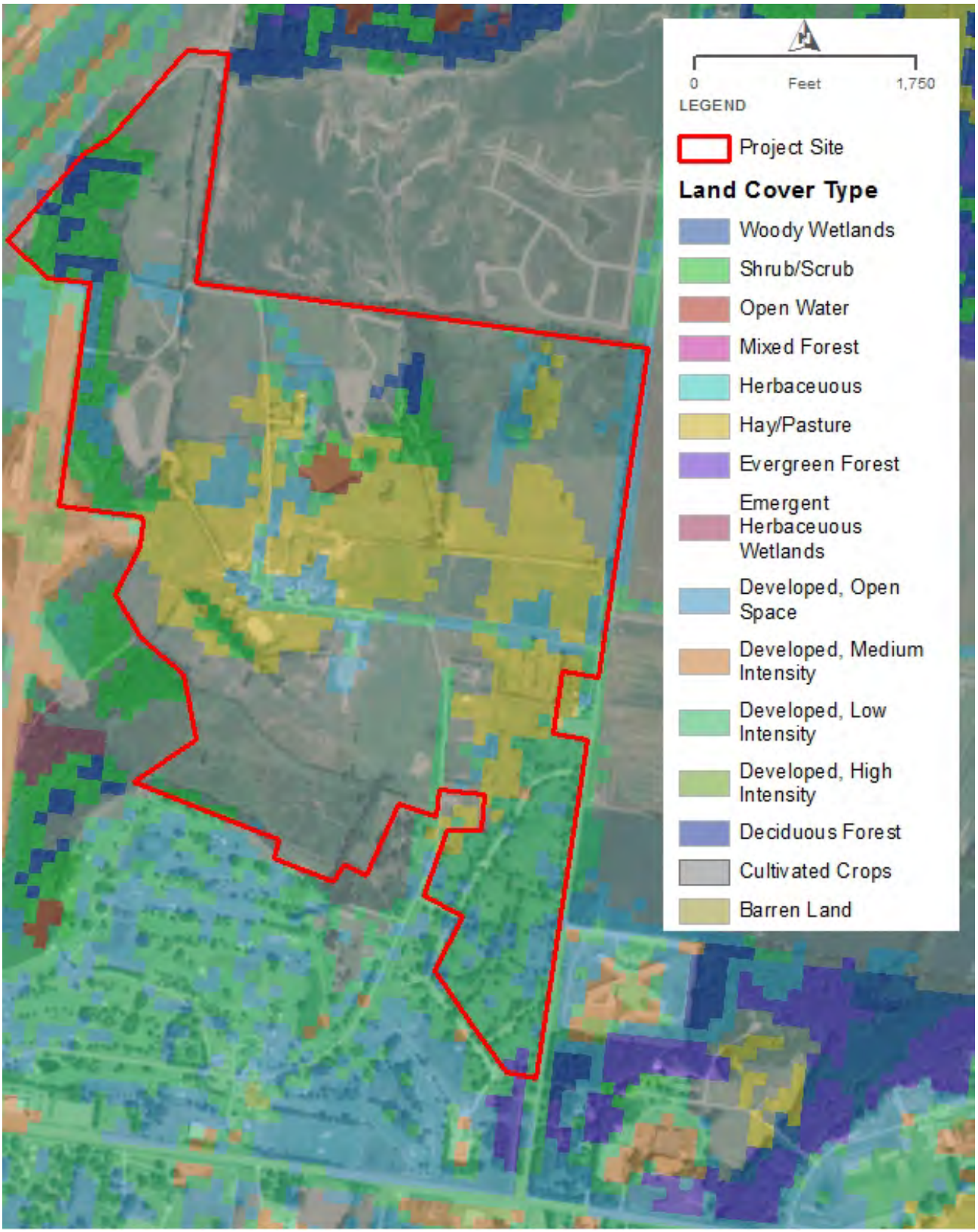

Figure 8. Land cover on the solar facility site and adjacent area.

3.1.2 Environmental Consequences

This section describes the potential impacts to land use should the Proposed Action or No Action Alternative be implemented.

3.1.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no project-related impacts to land use would result. Existing land use would be expected to remain a mix of pastureland and small forested areas until the site is developed for industrial and commercial uses in accordance with the BRAC process and current zoning. The pastureland is currently maintained by periodic mowing. Should this mowing cease, it would be converted to undeveloped shrub land and forest.

3.1.2.2 Proposed Action Alternative

Under the Proposed Action, the construction and operation of the solar facility would change the land use of the 438-acre facility site from pasture to industrial. Since the majority of the project site is zoned General Industrial, with a section on the eastern portion zoned General Commercial, the development of the project site as a solar facility is compatible with its current land use zoning. The surrounding area to the north is largely cropland, undeveloped, and sparsely residential, though due to its location in the outskirts of Memphis, the land use may change over the next 20 years. Following decommissioning of the solar facility, a large portion of the site could return to previous agricultural use or could be used for residential or other development depending on zoning ordinances in effect at that time. The area of the project site owned by SRC, but not developed as a solar facility is likely to remain undeveloped.

Since the Project is on primarily agricultural land and there are no outdoor recreation areas, development of the proposed transmission line, solar facility site, and distribution line should have no impact on public recreation activities or facilities. The activities associated with the Proposed Action would not have any indirect effects on land use.

3.2 GEOLOGY, SOILS, AND PRIME FARMLAND

This section describes the existing geological resources in the project area and the potential impacts on these geological resources that would be associated with the No Action and Proposed Action Alternatives. Components of geological resources that are analyzed include geology, paleontology, geological hazards, soils, and prime farmland.

3.2.1 Affected Environment

3.2.1.1 Geology

The project site is located in Shelby County, Tennessee, in the Gulf Coastal Plain Province. This province extends from the Florida Panhandle to eastern Texas and from Kentucky to the Yucatan Peninsula in Mexico. The Project is in the East Gulf Coastal Plain section and dates to the Quaternary Period. The landscape varies greatly in topography from rolling hills near the

Appalachian Mountains to the flat sandy coastal regions near the Gulf of Mexico (LandScope America 2016).

3.2.1.2 Paleontology

Western Tennessee was a shallow, tropical sea during the Cenozoic era. Significant paleontological resources are present in Middle and Eastern Tennessee regions near Nashville. Shelby County is not known for paleontological resources (Paleoportal 2017). It is unlikely that fossil remains are present within the project boundary which is located in an area not typically associated with paleontological finds.

3.2.1.3 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. Conditions do not exist on the project site for a majority of these types of hazards. The project area is located on relatively stable ground and no significant slopes are present within several miles; therefore, landslides are not a potential risk. No volcanoes are present within several hundred miles of the project site. The predominant geologic unit in Shelby County is Quaternary-aged loess. The project site lacks the carbonate bedrock geology and karst landforms associated with sinkholes.

Seismic activity at the site could cause surface faulting, ground motion, ground deformation, and conditions including liquefaction and subsidence. The Modified Mercalli Scale is used within the United States to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of “g,” the acceleration due to gravity. The USGS Earthquake Hazards Program publishes seismic hazard map data layers that display the PGA with 10 percent (1 in 500-year event) probability of exceedance in 50 years. The potential ground motion for the proposed project area is 0.60g, for a PGA with a 2 percent probability of exceedance within 50 years (Figure 9; USGS 2008).

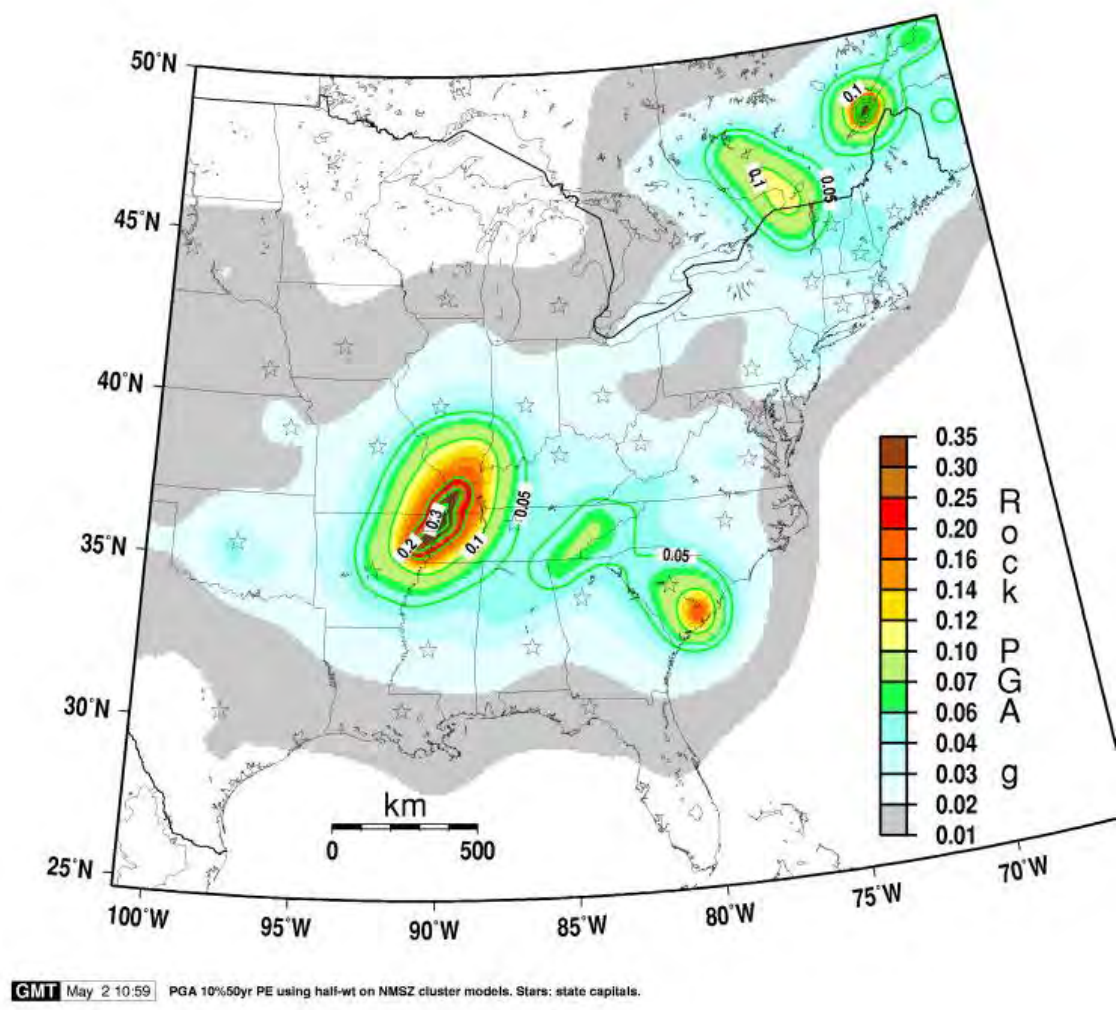

Figure 9. Seismic risk in the eastern United States.

3.2.1.4 Soils

The project site contains 12 soil types. The majority of the soils on the project site are composed of Loring silt loam and Falaya silt loam with several other types of soil consisting of less than 10 percent each (Figure 10 and Table 2). The distribution line corridor contains five soil types, all of which are common to the project site, including graded land (6.7 acres), Falaya silt loam (2.3 acres), Grenada silt loam (2.0 acres), filled land (0.6 acre), and Calloway silt loam (0.3 acre).

Loring silt loam, Calloway silt loam, Grenada silt loam, and Falaya silt loam all classified as prime farmland, which is described in Section 3.2.1.5 (Figure 10 and Table 2; U.S. Department of Agriculture [USDA] NRCS 2016).

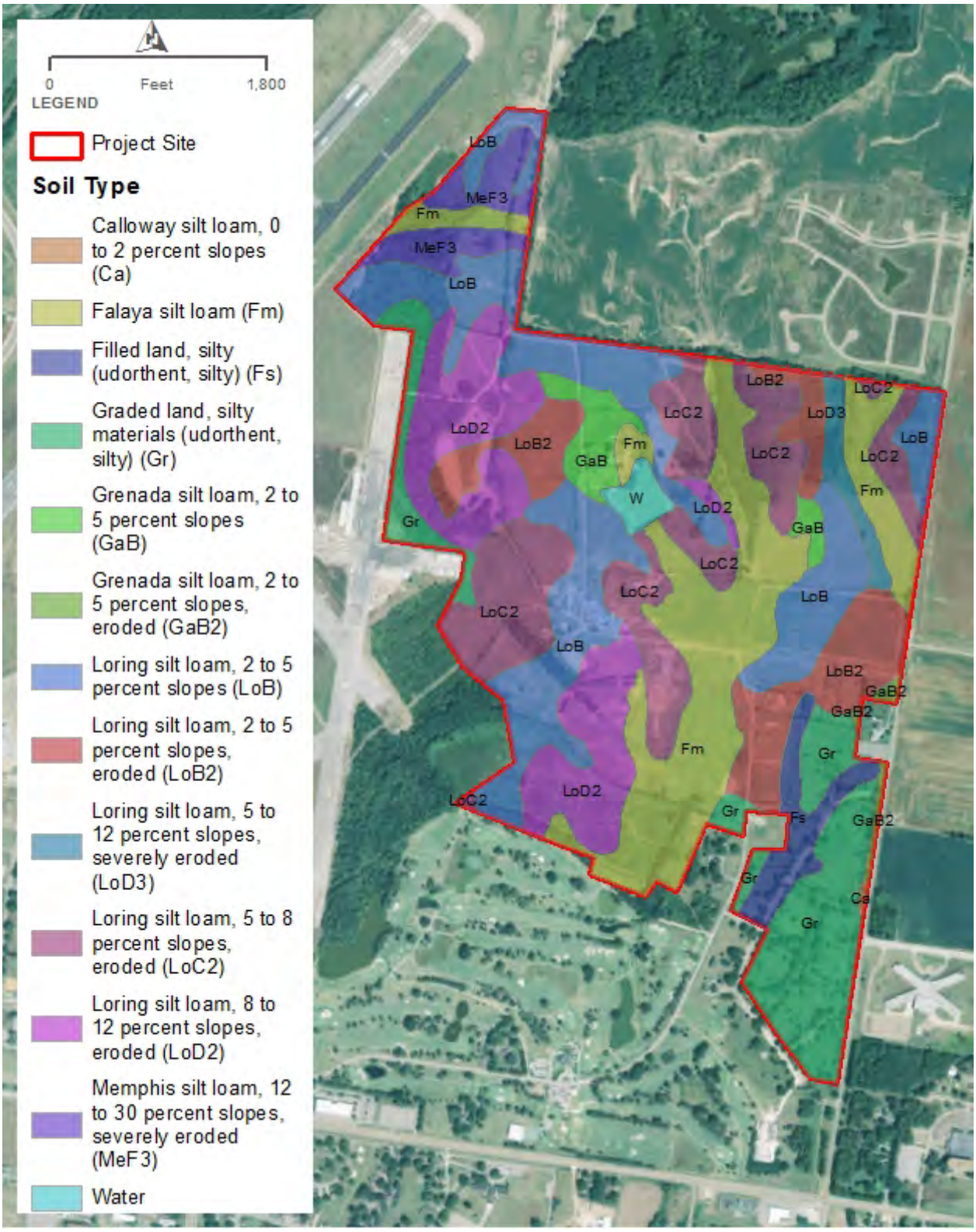

Figure 10. Soils on the project site.

Loring series soils consist of moderately well drained soils with a fragipan. These soils formed in loess on level to strongly sloping uplands and stream terraces with slopes ranging from 0 to 20 percent. Loring series are moderately well drained with moderate permeability above the fragipan. The main uses for the soils are for growing cotton, small grains, soybeans, hay, and pasture (Soil Series 2013a). Falaya series consist of very deep, somewhat poorly drained, moderately permeable soils that formed in silty alluvium from loess. They are subject to flooding and are saturated with water at 1 to 2 feet during periods of high rainfall. Slopes rarely vary from 0 to 2 percent. The soils are somewhat poorly drained with slow runoff and moderate permeability. The soil is often used for growing corn, cotton, soybeans, and small grains with native vegetation being mixed hardwood (Soil Series 2013b). Calloway series soils consist of very deep, somewhat poorly drained soils that formed in thick loess or water reworked loess deposits on broad, nearly level to gently sloping uplands and stream terraces in the southern Mississippi Valley Silty Uplands. Calloway series soils have seasonally high water tables perched over a thick fragipan with slopes ranging from 0 to 5 percent. Calloway soils are somewhat poorly drained; runoff is low to medium on slopes less than 1 percent and medium to high on slopes up to 5 percent; slow permeability in the fragipan. These soils are often used for crop growth (Soil Series 2002a). The Grenada series consists of very deep, moderately well drained soils that formed in thick loess. These soils are shallow or moderately deep to a fragipan that perches water during wet seasons in late winter and early in spring. Permeability is moderate above the fragipan and slow in the fragipan. These nearly level to strongly sloping soils are in the Southern Mississippi Valley Silty Uplands; slopes range from 0 to 12 percent. Grenada soils are moderately well drained with permeability moderate above the fragipan (Soil Series 2002b). The Memphis series consists of very deep, moderately permeable, well drained soils that formed in loess deposits more than 48 inches (121.92 cm) in thickness. These soils are on terraces and uplands of the Coastal Plain; slopes range from 0 to 50 percent. Memphis series soils are well drained with medium to very high runoff and moderate permeability (Soil Series 2011). Graded land is composed of primarily udorthent soils. This soil complex consists of moderately well drained to excessively drained soils that have been disturbed by cutting or filling, and areas that are covered by buildings and pavement (USDA NRCS 2017)

The transmission line corridor contains seven soil types, four of which are common to the project site and distribution line corridor. Soils in the transmission line corridor include Falaya silt loam (31.3 acres), Calloway silt loam (4.9 acres), Grenada silt loam (GaB and GaB2, prime farmland, 5.1 acres), Grenada silt loam (GaC3), 5 to 8 percent slopes severely eroded (not prime, 1.0 acre) Henry silt loam (He, not prime, 7.2 acres), Loring silt loam (LoB and LoB2, prime farmland, 3.9 acres), Loring silt loam (LoC2, not prime, 1.2 acres), and Waverly silt loam (Wv, not prime, 4.6 acres). The Henry series consists of very deep, poorly drained soils that have a slowly permeable fragipan in the subsoil. These soils formed in loess more than 4 feet in thick in depressions and nearly level areas on uplands and terraces. Slopes are dominantly less than 1 percent, but range from 0 to 2 percent (Soil Series 2013c). The Waverly series consists of nearly level, very deep, poorly drained soils that have moderate permeability. These soils are on floodplains of streams that drain the Southern Mississippi Valley Silty Uplands Major Land Resource Area and on alluvial fans along the eastern edge of the Southern Mississippi Valley

Alluvium Major Land Resource Area. They formed in silty alluvium derived from loess. Slopes range from 0 to 2 percent (Soil Series 2002c).

3.2.1.5 Prime Farmland

Prime farmland is land that is the most suitable for economically producing sustained high yields of food, feed, fiber, forage, and oilseed crops. Prime farmlands have the best combination of soil type, growing season, and moisture supply and are available for agricultural use (i.e., not water or urban built-up land).

The Farmland Protection Policy Act ([FPPA]; 7 United States Code [U.S.C.] 4201 *et seq.*) requires federal agencies to take into account the adverse effects of their actions on prime or unique farmlands. The purpose of the FPPA is "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses."

The soil types which are considered prime farmland on the project site and distribution line corridor are Calloway silt loam, Falaya silt loam, Grenada silt loam, and Loring silt loam 2 to 5 percent slopes. Table 2 provides a detailed description of all of the soil types located on the project site. The soil types which are considered prime farmland within the transmission line corridor are Falaya silt loam, Calloway silt loam, Grenada silt loam GaB and GaB2, and Loring silt loam LoB and LoB2.

Table 2. Soils on the project site.

Soil type	Farmland classification	Hydric rating	Area (acres)	Percentage of area
Calloway silt loam, 0 to 2 percent slopes (Ca)	All areas are prime farmland	0	0.4	0.1
Falaya silt loam (Fm)	All areas are prime farmland	0	80.8	18.4
Filled land, silty (udorthent, silty) (Fs)	Not prime farmland	0	12.8	2.9
Grenada silt loam, 2 to 5 percent slopes (GaB)	All areas are prime farmland	0	11.7	2.7
Grenada silt loam, 2 to 5 percent slopes, eroded (GaB2)	All areas are prime farmland	0	2.0	0.5
Graded land, silty materials (udorthent, silty) (Gr)	Not prime farmland	0	51.4	11.7
Loring silt loam, 2 to 5 percent slopes (LoB)	All areas are prime farmland	0	88.7	20.2
Loring silt loam, 2 to 5 percent slopes, eroded (LoB2)	All areas are prime farmland	0	41.9	9.6
Loring silt loam, 5 to 8 percent slopes, eroded (LoC2)	Not prime farmland	0	65.1	14.9

Soil type	Farmland classification	Hydric rating	Area (acres)	Percentage of area
Loring silt loam, 8 to 12 percent slopes, eroded (LoD2)	Not prime farmland	0	57.2	13.1
Loring silt loam, 5 to 12 percent slopes, severely eroded (LoD3)	Not prime farmland	0	6.4	1.5
Memphis silt loam, 12 to 30 percent slopes, severely eroded (MeF3)	Not prime farmland	0	15.5	3.5
Water (W)	Not prime farmland	-	4.4	1
Total	**Prime Farmland**	**-**	**225.5**	**51.4**

***Source*:** NRCS 2016

The location of prime farmland soils on the project site is identified on Figure 11. Based on information from the USDA NRCS, prime farmland soils occur on approximately 225.5 acres (51.4 percent) of the 438-acre project site. Approximately 4.6 acres of prime farmland (of the total 11.9 acre corridor area) occurs on the proposed distribution line corridor. Within the 390 acres of the facility site (area to be cleared or graded), approximately 197.5 acres (50.6 percent of facility site) are considered to contain prime farmland soils. Within the proposed transmission line corridor, prime farmland occurs on approximately 45 acres of the approximately 59 acre area.

Table 3 provides a summary of farming in Shelby County and overall in the state of Tennessee for comparison.

Table 3. Farming statistics for Shelby County, Tennessee.

	Number of farms	Percentage of total area in farms	Land in farms (acres)	Average size of farms (acres)
Shelby County	411	16.3	81,860	199
Tennessee	68,050	41.2	10,867,812	160

Source: USDA 2012

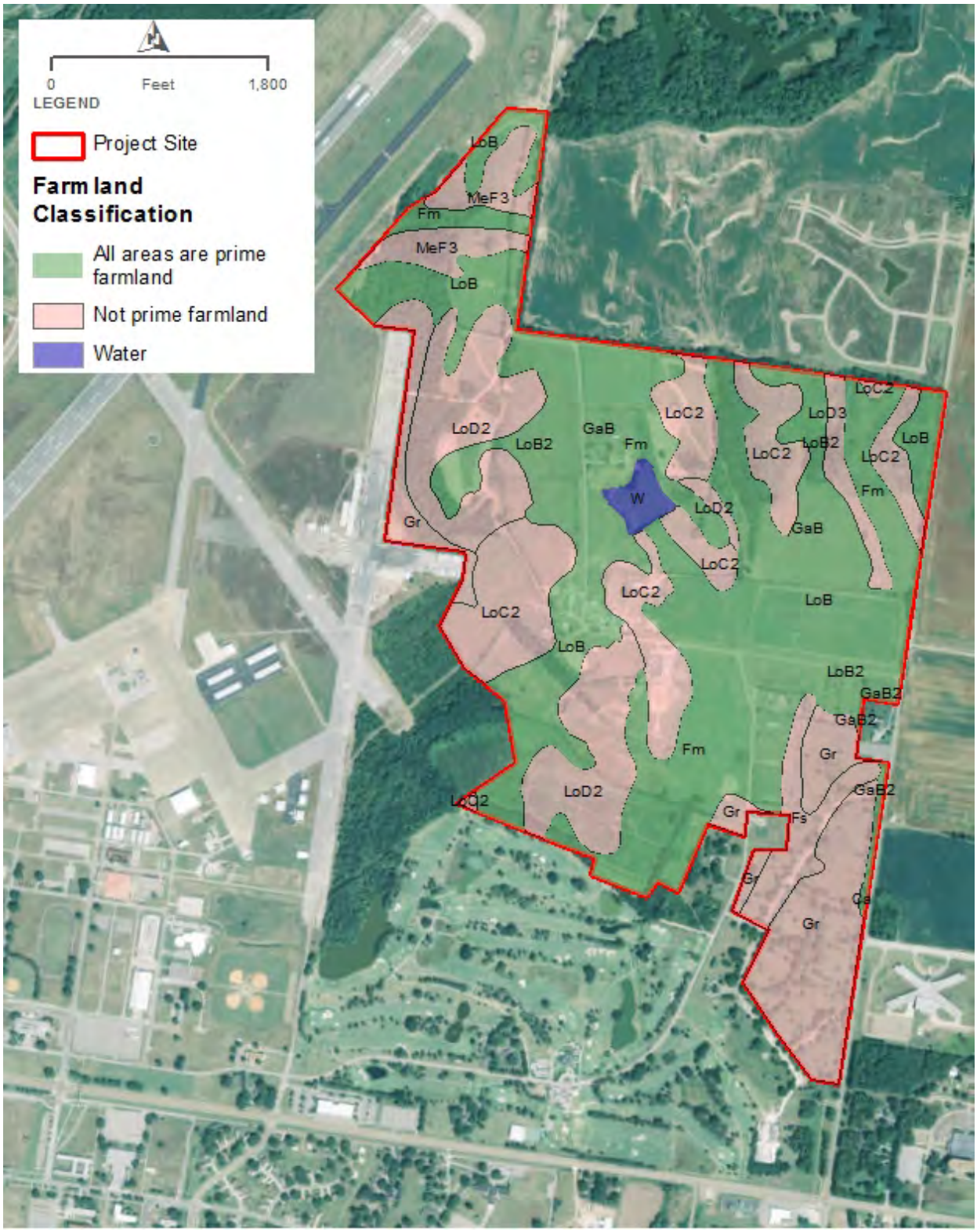

Figure 11. Soils classified as farmland on the project site.

3.2.2 Environmental Consequences

This section describes the potential impacts to geologic resources and prime farmlands should the Proposed Action or No Action Alternative be implemented.

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no direct or indirect project related impacts on geological, paleontological, soil resources, or prime farmlands would result. Existing land use would be expected to remain a mix of pastureland and forested areas.

Over time, impacts to soils and geology could occur if the current land use practices are changed. If the site were to be developed, changes to the soils on site would occur. Conversely, if previous agricultural practices were continued without proper conservation practices, soils could eventually become depleted in nutrients or erode resulting in minor changes on the site. This degradation of soil quality could be mitigated with proper farming practices such as terracing and application of soil amendments.

3.2.2.2 Proposed Action Alternative

Under the Proposed Action, minor direct impacts to geology and soil resources would be anticipated as a result of construction and operation of the Project. Approximately 89 percent (390 acres) of land in the project site would be cleared and/or graded for the solar facility with the exception of biologically sensitive areas such as those associated with jurisdictional streams and wetlands. The site grading and clearing for the solar facility would cause minor impacts to geology and soils including minor, localized increases in erosion and sedimentation.

Geology and Paleontology

Under the Proposed Action, minor impacts to geology could occur. No geotechnical evaluation of the project site was completed.

The solar arrays would be supported by steel piles which would either be driven or screwed into the ground to a depth of 6 to 10 feet. On-site sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected with underground wiring placed in trenches about 3 feet deep. Additional minor excavations would be required for the medium voltage transformers associated with each PCS unit and for the substation. Due to the small sizes of the subsurface disturbances, only minor direct impacts to potential subsurface geological resources are anticipated.

As excavation would be limited, only minor direct impacts to geological resources would be anticipated. Should paleontological resources be exposed during site construction (i.e., grading and foundation placement) or operation activities, a paleontological expert would be consulted to determine the nature of the paleontological resources, to recover these resources, to analyze the potential for additional impacts, and to develop and implement a recovery plan/mitigation strategy.

Geologic Hazards

Hazards resulting from geological conditions would be minor because the project site is in a relatively stable geologic setting. There is a moderate potential for small to moderate intensity seismic activity. The facility would be designed to comply with applicable seismic standards. Either seismic activity or sinkholes would likely only cause minor impacts to the project site and equipment on the site. Geologic hazard impacts on the site would be unlikely to impact off-site resources.

Soils

As part of the site preparation and development process, approximately 390 acres of the project site would be developed. The project site could be temporarily affected during mowing and construction activities. Soils located in areas where only vegetation clearing is proposed would remain in place unless a circuit trench or foundation would be constructed.

The Project was designed to minimize impacts to on-site streams and wetlands. Although not anticipated, should borrow material be required, small amounts of sand and gravel aggregate may be obtained either from on-site activities within the 390-acre portion of the project site, or from local, off-site sources. The creation of new impervious surface, in the form of panel footings and the foundations for the inverter stations and substation, would result in a minor increase in storm water runoff and potential increase in soil erosion. Use of BMPs such as soil erosion and sediment control measures would minimize the potential for increased soil erosion and runoff. Due to the project disturbance area being at least 1 acre, a NPDES Permit for discharges of storm water associated with construction activities would be required. Application for the permit would require submission of a SWPPP describing the management practices that would be utilized during construction to prevent erosion and runoff and those to reduce pollutants in storm water discharges from the site. Following construction, implementation of soil stabilization and vegetation management measures would reduce the potential for erosion impacts during site operations.

During operation of the solar facility, very minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement, inverter air filter replacement, fence repair, vegetation control, and periodic array inspection, repairs and maintenance. The Project may implement traditional mechanized landscaping using lawnmowers, weed eaters, etc. Traditional trimming and mowing would be performed periodically to maintain the vegetation at a height ranging from 6 inches to 2 feet. Selective use of herbicides may also be employed around structures to control weeds. Products used would be limited to postemergent herbicides and would be applied by a professional contractor. These maintenance activities would not result in any adverse impacts to soils on the project site during operations.

Prime Farmland

Should the Proposed Action be implemented, approximately 89 percent (390 acres) of the 438-acre project site would be covered with panels, roads, sedimentation basins and project

infrastructure and removed from potential farm use; this would include approximately 197.5 acres of prime farmland or approximately 50.6 percent of the total prime farmland soils at the project site. Because the construction and operation of the Project transmission line would not result in the conversion of any prime farmland to long-term nonagricultural uses (although it could result in minor changes to any ongoing farming practices), its prime farmland along the proposed route was not evaluated.

The construction and operation of the solar facility would remove approximately 197.5 acres of prime farmland from potential agricultural use and would result in conversion of the entire 390-acre fenced in area from pastureland to a developed solar power facility. The remaining 48 acres of the project site would remain undisturbed with the exception of tree trimming for the proposed distribution line. Appropriate erosion control measures would be used to control erosion and limit sediment/soil from leaving the project site. Due to the limited amount of grading and excavation on site, the majority of existing soils would remain in-situ. During grading, topsoil would be removed and stockpiled and, as grading is nearing completion, redistributed over the graded areas. None of the soils within the project area are classified as highly erosive or have other characteristics that would require special construction techniques or other nonroutine measures. The proposed electrical lines would not convert the use of the prime farmlands within the ROWs/easements, most of which are currently used for row crop production.

Following the expiration of PPAs or land lease from the Navy, the solar facility would be decommissioned as described in Section 2.2.5. Once the facility components are removed and the site is stabilized, farming could resume with little long-term loss of soil fertility and potential agricultural production.

Because the proposed solar facility, the proposed electrical substation, and the proposed distribution line are within the Millington city limits and zoned for General Industrial and General Commercial uses, they are not subject to the requirements of the FPPA. However, in accordance with FPPA evaluation procedures, a USDA Farmland Conversion Impact Rating Form (Form AD-1006) was completed for the project site to quantify the potential impacts to prime farmland. The impact rating considers the acreage of prime farmland to be converted, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban environments, percentage of corridor currently being farmed, and compatibility with existing agricultural use. This form assigns a numerical rating between 0 and 260 based on the area of prime farmland to be disturbed, the total area of farmland in the affected county, and other criteria. Sites with a total score of at least 160 have the potential to adversely affect prime farmland. The impact rating score was 144 points for the project site (Appendix B). Projects with total impact rating scores below the threshold value of 160 do not require further consideration under the FPPA.

Based on the ratings for the project site, the impacts to prime farmland from the Proposed Action would be insignificant and overall effects on soils, including prime farmland, as a result of the construction and operation of the solar facility would be considered insignificant. Following

the eventual decommissioning and removal of the solar facility, the site could be returned to agricultural use.

3.3 WATER RESOURCES

This section describes an overview of existing water resources in and surrounding the proposed project area in Shelby County, Tennessee, and the potential impacts on these water resources that would be associated with the No Action and Proposed Action Alternatives. Components of water resources that are analyzed include groundwater, surface water, and floodplains.

3.3.1 Affected Environment

3.3.1.1 Groundwater

Groundwater is water located beneath the ground surface, within soils and rock formations. Aquifers are rock units that have sufficient permeability to conduct groundwater and to allow economically significant quantities of water to be produced by man-made water wells and natural springs. To be productive, the aquifer must be permeable and porous and retain qualities that allow water to flow through it easily. Sandstones, conglomerates, and fractured rocks can often be productive aquifers. The aquifer underlying the project site in Shelby County is the Upper Claiborne aquifer and the Middle Claiborne aquifer, part of the Mississippi embayment aquifer system in the Coastal Plain Physiographic province. The Mississippi embayment aquifer system is in Alabama, Arkansas, Florida, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee (USGS 1995).

Aquifers in the Coastal Plain Physiographic Province consist of unconsolidated to semiconsolidated sediments that range from the Late Cretaceous through late Eocene period. The geologic units of the Coastal Plain Physiographic Province include deposits of Tertiary sedimentary marine rocks. In the project region, the Upper Claiborne aquifer is the uppermost hydrogeological unit of the Mississippi embayment aquifer system and consists of sediments of Eocene age and varies between sand, silt and clay. Precipitation falling directly on surface outcrops of the aquifer units provides the primary water recharge for the Upper Claiborne aquifer with a small recharge from upward leaking due to underlying aquifers. Most of this precipitation becomes surface water streams, but some percolates through the soil and drains into cracks and fissures in the bedrock. Groundwater flow in this aquifer system primarily flows in the general direction of the Mississippi River to the southwest along the axis of the Mississippi Embayment (USGS 1995). The Middle Claiborne aquifer consists of the upper part of the Memphis Sand and is a principle source of groundwater in the region (Lloyd and Lyke 1995). Sands which comprise this aquifer were derived from continental sources and are thick and massive with few clay confining layers. This results in an extremely well connected hydraulic unit which allows large quantities of water to be withdrawn from the aquifer. Due to the absence of carbonate rock strata, the area is not prone to the development of karstic features. While there are private wells located in the general area, public water is available to the public in project area. The source for this system is from wells which withdraw from the Middle Claiborne aquifer (USGS 1995).

The water quality in the Mississippi embayment aquifer system is generally suitable for most uses. It ranges from soft to moderately hard, calcium bicarbonate near the edges with sodium bicarbonate towards the deeper sections of the aquifer. Iron, fluoride, and sulfate concentrations

are low throughout the aquifer system. Dissolved solids are usually less than 250 milligrams per liter for most of the Mississippi embayment aquifer, though deeper sections of the aquifer can see dissolved solid levels spike to over 1,000 milligrams per liter. The project area is in the shallower area of the aquifer and has the lowest concentrations (USGS 1995). A U.S. Geological Survey conducted in 1997 of the Millington area, detected isolated areas which were contaminated with volatile organic compounds related to jet fuel and chlorinated solvents (USGS 1997).

In 1985, fresh groundwater withdrawals from the Mississippi embayment aquifer system in Kentucky and Tennessee were estimated to be 311 million gallons per day (mgd), mostly from Tertiary rocks in Tennessee. The Memphis, Tennessee area is supplied totally by groundwater and accounts for 196 million gallons of withdrawal per day. Public supply, industrial, commercial, and thermoelectric power accounted for more than 90 percent of the groundwater withdrawn from the aquifers in Kentucky and Tennessee, with public supply withdrawals accounting for 65 to 70 percent in Mississippi (USGS 1995).

3.3.1.2 Surface Water

Surface water is any water that flows above ground and includes, but is not limited to, streams, ditches, ponds, lakes, and wetlands. Streams are classified as perennial, intermittent, and ephemeral based on the occurrence of surface flow. Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, and wet meadows.

Surface waters with certain physical and hydrologic characteristics (defined bed and bank, ordinary high water mark [OHWM], or specific hydrologic, soil, and vegetation criteria) are considered Waters of the U.S. (or jurisdictional waters) and are under the regulatory jurisdiction of the U.S. Army Corps of Engineers (USACE). The CWA is the primary federal statute that governs the discharge of pollutants and fill materials into Waters of the U.S. under Sections 402, 404 and 401. The limits of Waters of the U.S. are defined through a jurisdictional determination accepted by USACE. State agencies have jurisdiction over water quality.

The proposed project site is located in the Middle Big Creek Subwatershed (12-digit Hydrologic Unit Code [HUC] 080102090302), Big Creek Watershed (HUC-10 0801020903), in the Loosahatchie Watershed (HUC-8 08010209). The Loosahatchie Watershed is part of the Mississippi River Basin and is located in Western Tennessee and includes parts of Fayette, Hardeman, Haywood, Shelby, and Tipton Counties. The Loosahatchie Watershed has approximately 1,436 miles of streams and 81 reservoir/lake areas, and drains approximately 741 square miles to the Loosahatchie River, which drains to the Mississippi River (USEPA 2011a).

The project area drains to several streams within the Loosahatchie River Watershed, including Casper Creek, unnamed tributaries of Casper Creek, Big Creek, and unnamed tributaries of Big Creek. All surface waters listed are classified by the state (TDEC 2013) for fish and aquatic life, recreation, livestock watering and wildlife, and irrigation. Big Creek begins in Tipton County approximately 10 miles north of the project site near Munford, Tennessee and flows south

approximately 12 miles into Big Creek Canal south of the project site, which flows west into the Loosahatchie River (USEPA 2011a). Big Creek is considered impaired for recreation due to *Escherichia coli* (E. coli) and for fish and aquatic life due to oxygen depletion, total phosphorus, nitrate-nitrite, sedimentation, and physical substrate habitat alterations due to multiple point source discharges and channelization (TDEC 2016). USEPA has approved a Total Maximum Daily Load (TMDL) for E. coli in the Loosahatchie River Watershed that addresses some of the pollution, but additional TMDLs are noted as necessary (USEPA 2011a).

Prior to field surveys, a desktop assessment using USGS National Hydrologic Dataset (NHD), NWI, USEPA NEPAssist mapping tool, and topographic maps was conducted to assess the project site and proposed distribution and transmission line corridors for the presence of streams and wetlands.

Proposed Solar Facility

On March 28, 2016, Barge Waggoner Sumner & Cannon, Inc. (BWSC) reviewed the project site for jurisdictional wetlands and streams under Section 404 of the CWA and submitted a preliminary jurisdictional determination to USACE-Memphis District. On November 2, 2016, HDR, and Mitch Elcan (USACE Memphis District) met on site to discuss the previous delineation performed and assess the current field conditions. During the meeting, it was determined that two of three intermittent streams and all of the ephemeral streams were considered to be wet water conveyances (WWCs, also referred to as swales) and therefore not jurisdictional. The WWCs were constructed to drain the agricultural fields to the on-site wetlands and stream and were determined not to meet jurisdictional wetland criteria, nor did they meet the definition for classification as a jurisdictional stream. Additionally, nine of the identified wetlands existed outside of the project site. These determinations resulted in the submission of an amended jurisdictional determination on February 9, 2017 (Figure 12 and Figure 13). A preliminary jurisdictional determination verification letter for the project area was issued by USACE on February 24, 2017 (USACE file number MVM-2016-122). The verified jurisdictional determination identified one intermittent stream (2,659 linear feet) and seven wetlands (10.5 acres).

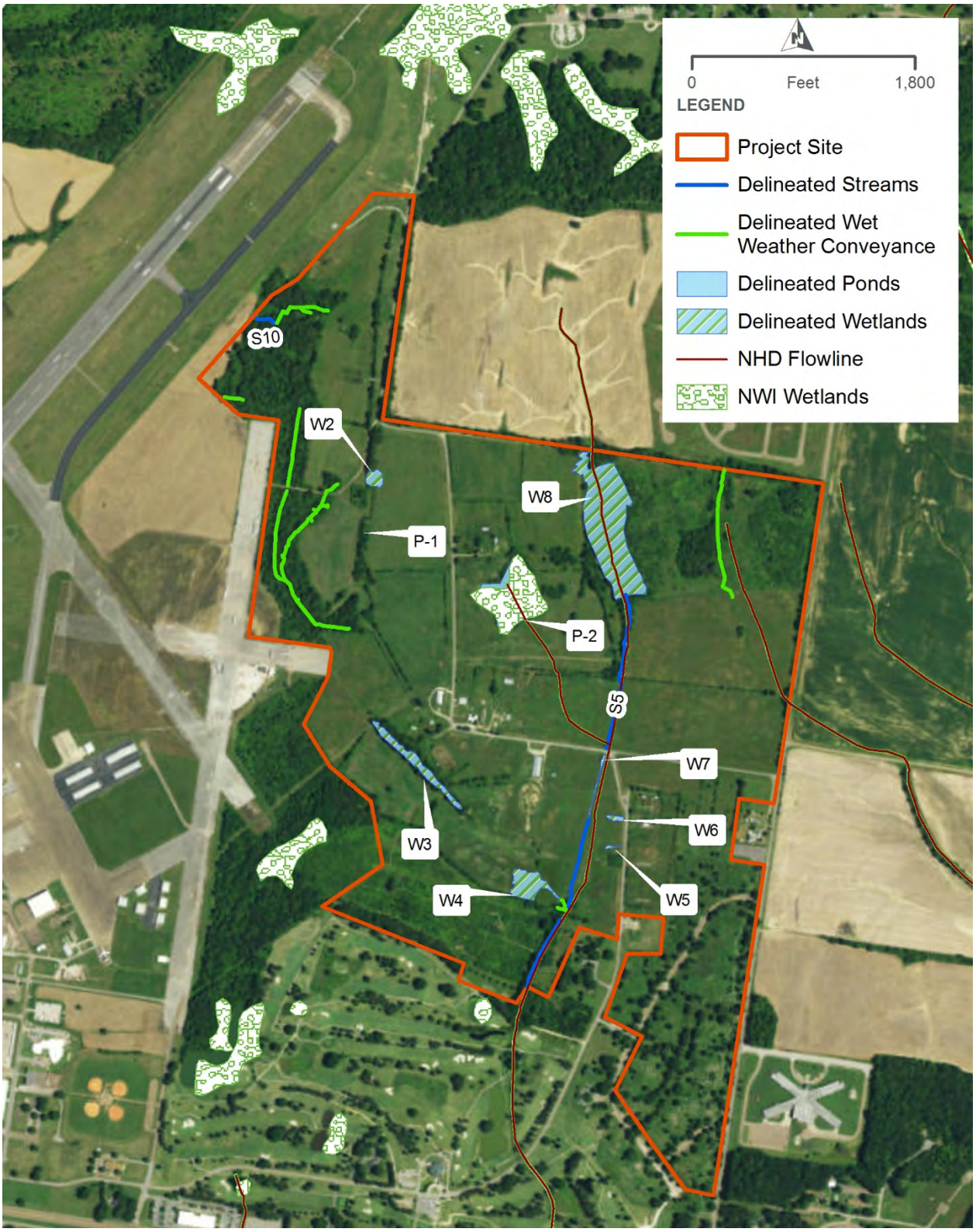

Figure 12. Aerial photograph showing wetlands, streams, and WWCs on the proposed solar facility site.

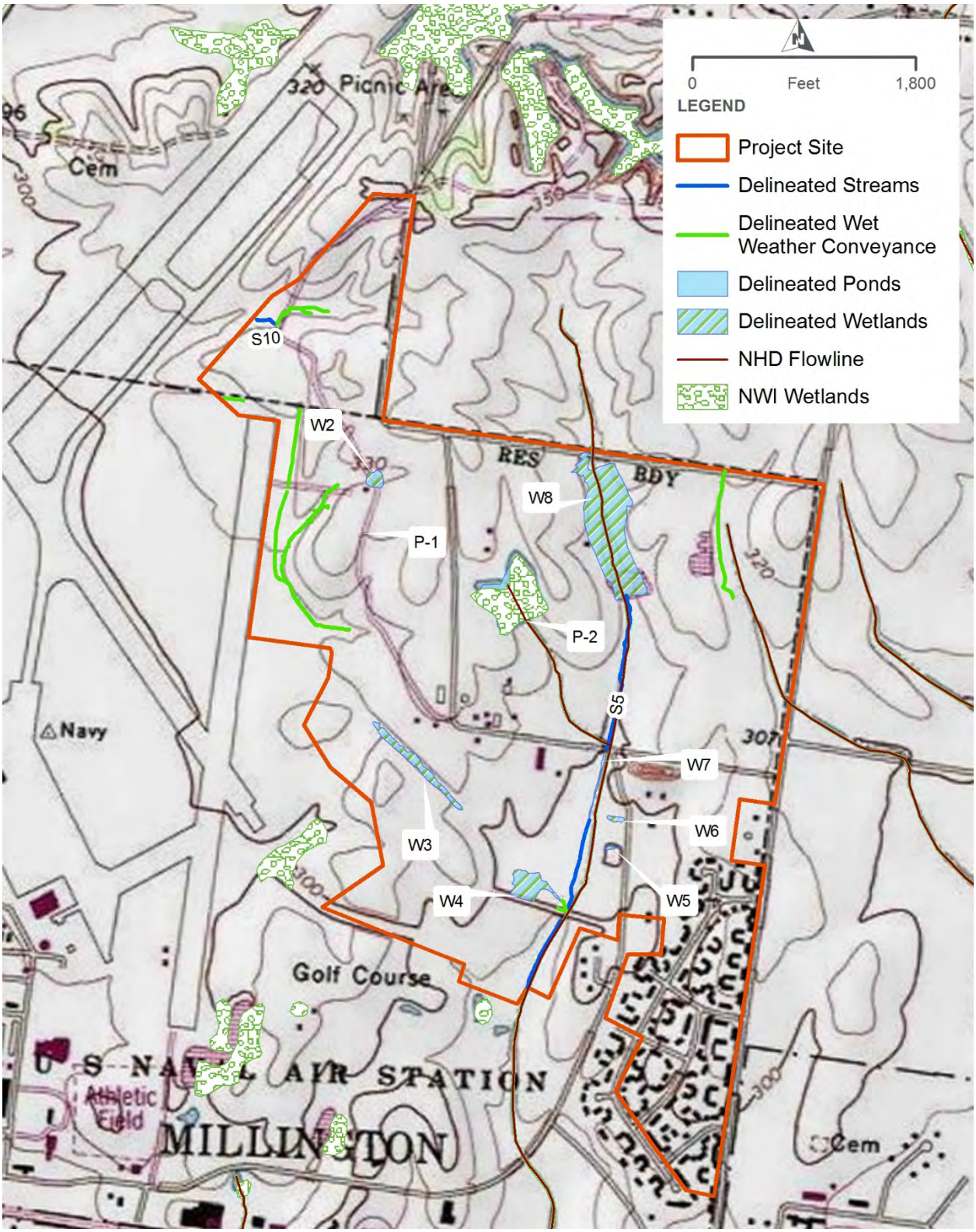

Figure 13. Topographic map showing wetlands, streams, and WWCs (USGS 1994) on the proposed solar facility site.

Wetland 2 is a 0.36-acre wetland in the northwestern portion of the project site. This is a depressional feature and is classified as a palustrine emergent wetland. Wetland 3 is a 1.14-acre palustrine forested wetland depression located in the western portion of the project site. Wetland 4 is a 1.24-acre palustrine emergent depressional wetland located in the south central portion of the project area. This wetland exists within a maintained pasture that was subject to mowing and grazing and has been slightly ditched at its outlet. This feature is part of an intermittent stream system (Stream 5). Wetland 5 (0.05 acre) and Wetland 6 (0.11 acre) are small palustrine emergent wetlands in the southeastern portion of the project site. Wetland 7 is a 0.14-acre linear wetland located slightly northwest of Wetland 6. This feature is classified as a palustrine emergent wetland and is part of an intermittent stream system (Stream 5). Wetland 8 is a 7.46-acre palustrine forested wetland in the north-central portion of the project site and serves as the headwaters for Stream 5.

The project site contains one on-site unnamed stream (Stream 5) which flows from north to south through the center of the property into Big Creek Canal (Figure 12 and Figure 13). Stream 5 is an intermittent stream, approximately 3 to 5 feet wide and 2,659 linear feet long within the project site. Stream 5 originates at the southern boundary of Wetland 8, flows into Wetland 7, and reemerges on Wetland 7's southern boundary. The stream then continues flowing southwest and feeds Wetland 4 via a WWC before it exits the project site (Figure 12 and Figure 13).

The project site also includes one on-site unnamed stream (Stream 10) that was classified as an intermittent stream by TDEC. Stream 10 is located in the northwestern corner of the site and is approximately 176 linear feet in length. Stream 10 originates downstream of an existing gravel road in the northwestern corner of the site and flows west for approximately 176 linear feet before exiting the project site (Figure 12 and Figure 13).

A desktop assessment revealed one ephemeral stream within the proposed distribution line corridor.

Transmission Line

Desktop reviews of NHD and topographic maps revealed five ephemeral or intermittent streams and two perennial resources within the proposed transmission line route. The proposed route of the TVA transmission line would cross Big Creek and Casper Creek east of the solar facility project site. The NWI map indicated 0.4 acre of forested wetland within the proposed transmission line corridor. An August 2017 field survey of the proposed transmission line corridor documented 6 ephemeral/WWCs, 7 perennial streams, 1 pond, and 19 wetlands (5.67 acres) within the proposed transmission line route.

Field surveys were conducted on August 2, 2017 to map wetland areas within the proposed Shelby-Drummonds TN 161kV transmission line ROW. Nineteen wetlands were identified during the field reconnaissance (Table 4 and Figure 14). Wetland determinations were performed according to USACE standards, which require documentation of hydrophytic (wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Lichvar et al. 2016; USACE 2010).

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

Table 4. Wetlands within the proposed transmission line ROW

Wetland Identifier	Type[1]	TVARAM Existing Functional Capacity	Acres on ROW	Forested
W001	PEM1E	Low (20)	0.22	--
W002	PEM1Ef	Low (21)	0.30	--
W003	PFO1E	Moderate (40)	0.32	0.32
W004a	PEM1E	Moderate (41)	0.05	--
W004b	PEM1E	Moderate (41)	0.07	--
W005	PFO1E	Moderate (30)	0.44	0.44
W006	PFO1E	Low (25)	0.03	0.03
W007	PEM1Ef	Low (20)	1.89	--
W008	PEM1Ef	Low (19)	0.12	--
W009	PEM1Ef	Low (19)	0.39	--
W010	PFO1E	Moderate (35)	0.72	0.72
W011	PSS1E	Low (34)	0.07	--
W012	PSS1E	Low (23)	0.02	--
W013	PFO1E	Low (24)	0.03	0.03
W014	PEM1Ef	Low (20)	0.60	--
W015	PFO1E	Low (21)	0.02	0.02
W016	PEM1Ef	Low (17)	0.04	--
W017a	PFO1E	Moderate (30)	0.02	0.02
W017b	PFO1E	Moderate (30)	0.02	0.02
W018	PSS1E	Moderate (39)	0.24	--
W019	PFO1E	Moderate (32)	0.06	0.06
		Total Acres	**5.67**	**1.66**

[1]Classification codes as defined in Cowardin et al. (1979): E=Seasonally flooded/saturated; F=farmed; PEM1=Palustrine emergent, persistent vegetation; PFO1=Palustrine forested, broadleaf deciduous vegetation; PSS1=Palustrine, scrub-shrub, broadleaf deciduous vegetation.

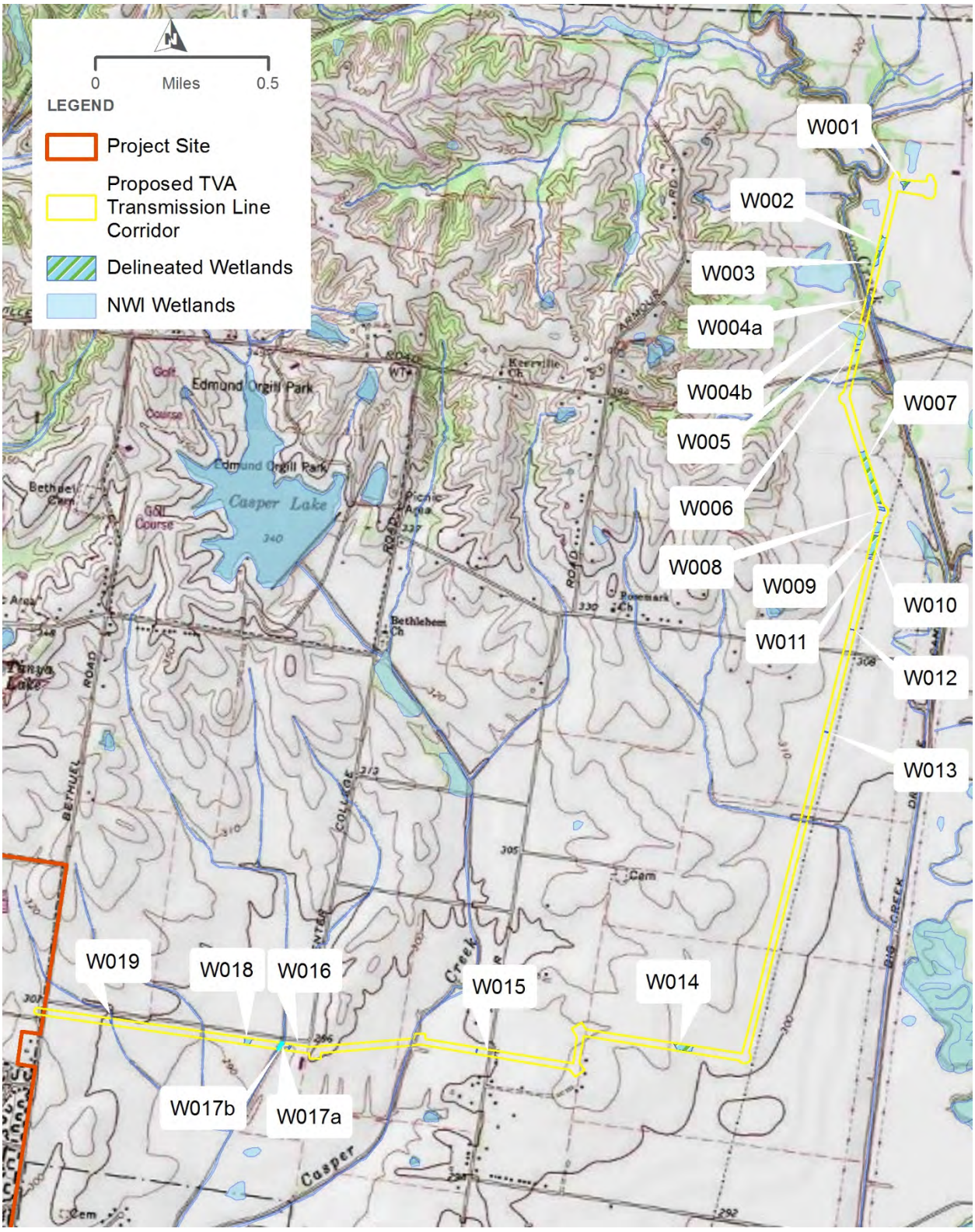

Figure 14. Topographic map showing wetlands, streams, and WWCs within the proposed transmission line ROW (USGS 1994)

The proposed transmission line ROW traverses a landscape dominated by agriculture. Wetland features within the vicinity of the project footprint primarily represent farmed wetland flats or linear wetland drains channelized to receive hydrology from adjacent (likely tiled) fields. W001 and W002 were comprised of wetland depressions within horse pastures near the Shelby Substation. W007, W008, and W009 comprised farmed wetland flats, planted in cotton, within the Big Creek Drainage Canal floodplain. These farmed wetlands exhibited crawfish burrows, saturated soils, and hydric soil coloration. Similarly, W014 contained tilled soils overgrown in the interior by wetland grasses, but otherwise planted in soy beans. This wetland area was inundated and exhibited hydric coloration in the soil profile. W016 consisted of a farmed wetland depression devoid of crops due to excessive inundation preventing growth. Likewise, wetland hydrology and hydric soils were present throughout. Farmed wetland determinations are difficult due to farming practices altering one or more of the normal wetland components necessary for wetland identification. Therefore, the regulatory agencies responsible for determining the jurisdictional status/extent of farmed wetlands could supersede TVA's determination.

Narrow, linear wetland drainage features located between the crop fields and spanned by the proposed right-of-way consisted of W006, W011, W012, W013, W015, W018 and W019. W006, W013, W015, and W019 contained wetland trees, constituting forested wetland drains; whereas, W011, W012, and W018 contained some shrubs and primarily seedling, and sapling stature vegetation, constituting scrub-shrub wetland drains. Dominant tree species generally included black willow, box elder, sugarberry, and cottonwood; and scrub-shrub vegetation typically included previously mentioned saplings and elderberry. W015 contained overcup oak. These linear wetland features exhibited wetland hydrology indicators and hydric coloration in the soil profile.

W003, W005, and W010 consisted of forested wetlands within the floodplain of the Big Creek Drainage Canal. W003 comprises an overflow wetland basin adjacent to the creek/canal; W005 constituted a forested wetland depression receiving overflow hydrology within the creek/canal's floodplain; and W010 was forested wetland habitat within a wide drainage flat feeding Big Creek Drainage Canal. Tree species across these wetland habitats typically included cottonwood, shellbark hickory, sugarberry, green ash, and/or American or slippery elm. These wetlands exhibited hydrology indicators such as drift deposits or drainage patterns; and the soil profile contained grey coloration with mottling, indicative of hydric conditions.

A total of 5.67 wetland acres are located within the proposed transmission line corridor, of which 3.34 acres are farmed, 0.34 acre is emergent, 0.33 acre is scrub shrub, and 1.66 acre are forested (Figure 14 and Figure 15).

3.3.1.3 Floodplains

The Federal Emergency Management Agency (FEMA) produces maps which show the likelihood of an area flooding. These maps are used to determine eligibility for the National Flood Insurance Program (NFIP). The NFIP aims to reduce the impact of flooding on private and public structures by encouraging communities to adopt and enforce floodplain management regulations to help mitigate the effects of flooding on structures. E.O. 11988, Floodplain

Management, requires federal agencies to "avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative."

No FEMA-designated floodplains or floodways are located within the 438-acre project site or the proposed distribution line corridor. The closest FEMA floodplains are approximately 0.25 mile from the project site and associated with Big Creek/Big Creek Canal and Casper Creek to the south and east of the project site. The proposed TVA transmission line would cross 100-year floodplains, designated as Zone AE, associated with Big Creek and Casper Creek (Figure 15).

3.3.2 Environmental Consequences

This section describes the potential impacts to water resources should the Proposed Action or No Action Alternative be implemented.

3.3.2.1 No Action Alternative

Under the No Action Alternative, the proposed Project would not be constructed; therefore, no project related impacts to water resources would be expected to occur. Existing land use would remain a mix of pasture and forested, privately-owned land and water resources would remain as they are at the present time. Indirect impacts to water resources could result due to the continuing use of the project site as pastureland. Increases in erosion and sediment runoff could occur if farming practices were not maintained to using BMPs. Erosion and sedimentation on site could alter runoff patterns on the project site and impact downstream surface water quality. In addition, if chemical fertilizers and pesticides are continually used, impacts to groundwater may occur if the local aquifers are recharged from surface water runoff.

3.3.2.1 Proposed Action Alternative

Under the Proposed Action, minor direct impacts to water resources (wetlands, streams, and groundwater) would be anticipated as a result of construction and operation of the Project. No impacts to floodplains are anticipated.

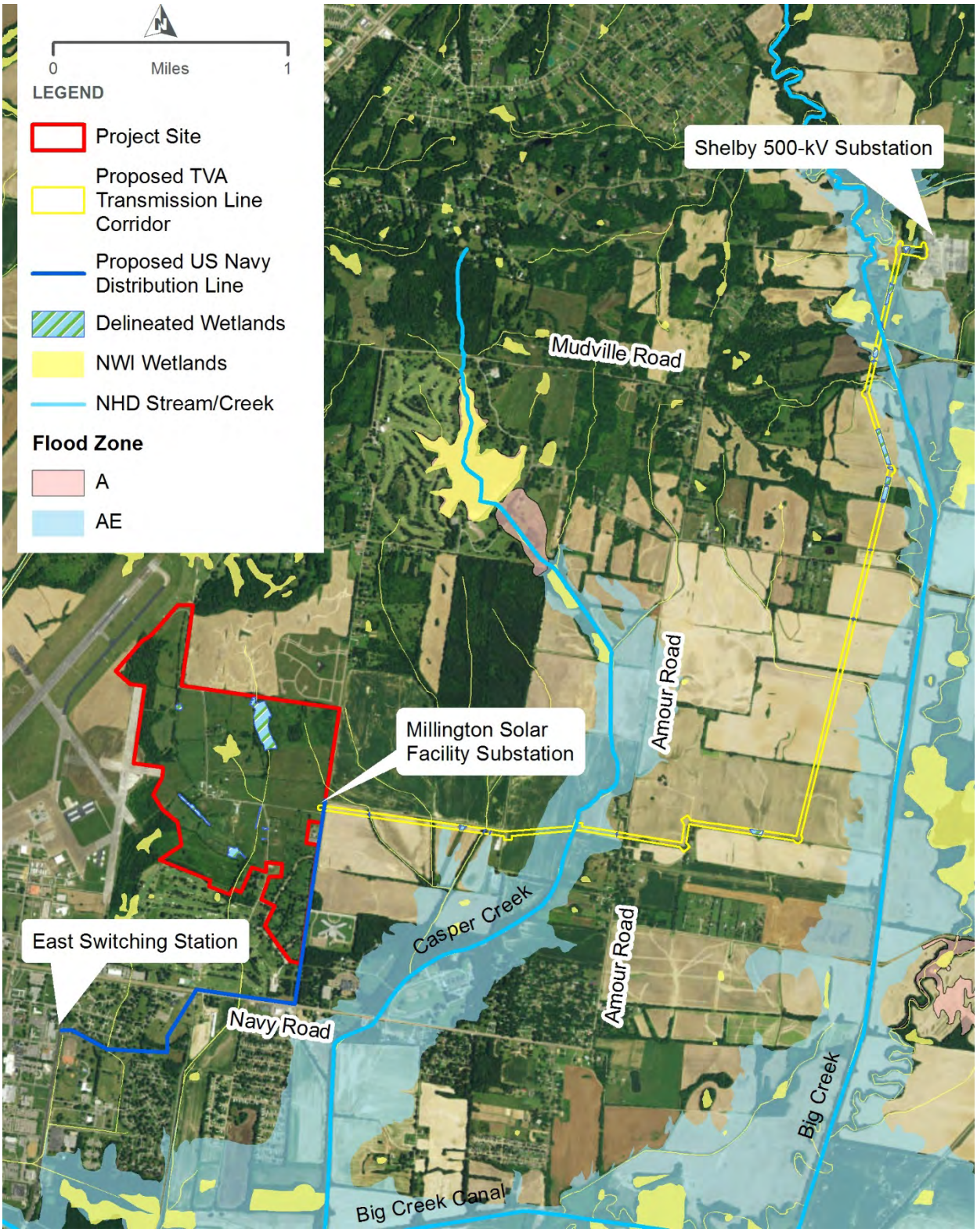

Figure 15. Floodplains and water resources in the project area.

Groundwater

No adverse impacts to groundwater would be anticipated as a result of the Proposed Action. Once installed, the solar facility would occupy 390 acres and the total surface area of PV panels would be 312 acres of the project site. The elevated, tilted panels would cover about 80 percent of the 390-acre facility site; however, they would have relatively little effect on groundwater infiltration and surface water runoff because the panels would not include a runoff collection system. Rainwater would drain off the panels to the adjacent vegetated ground. Hazardous materials that could potentially contaminate groundwater would be stored on site during construction. The use of petroleum fuels, lubricants and hydraulic fluids during construction and by maintenance vehicles would result in the potential for small on-site spills. The use of BMPs to properly maintain vehicles to avoid leaks and spills and procedures to immediately address any spills that did occur, would minimize the potential for adverse impacts to groundwater. Project activities could potentially cause erosion resulting in the movement of sediment into groundwater infiltration zones. BMPs as described in TVA (2017a) would be used to avoid contamination of groundwater from project activities. Fertilizers and herbicides would be used sparingly and in accordance with manufacturer's recommendations to avoid contamination of groundwater. With the use of these BMPs, potential impacts to groundwater would be minor.

Construction-related Water Needs

No water service is currently available at the proposed project site and no potable water would be available on site after construction. Construction-related water use would support site preparation (including dust control) and grading activities. During earthwork for the grading of access roads, foundations, equipment pads, and other components, the primary use of water would be for compaction and dust control. Smaller quantities would be required for preparation of the equipment pads and other minor uses. Water used during construction would be delivered by truck and would not adversely affect groundwater resources.

Operation and Maintenance-related Water Needs

The primary use of water during operation and maintenance-related activities would be for possible dust control (the proposed PV technology requires no water for the generation of electricity). The internal access roads would not be heavily traveled during normal operations and consequently water use for dust control is not expected. Many of the existing roads are paved and would not result in additional dust. Equipment washing and any potential dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning.

The precipitation in the area is adequate to minimize the buildup of dust and other matter on the PV panels that would reduce energy production; therefore no regular panel washing is anticipated. The panels would be cleaned if a specific issue is identified and depending on the frequency of rainfall, proximity of arrays to sources of airborne particulates and other factors. This water would be brought on site in trucks for the specific purpose of panel cleaning and should not impact groundwater resources.

Decommissioning and Site Reclamation-related Water and Wastewater Needs

Because conditions can change during the course of project life, a final Decommissioning and Closure Plan would be based on conditions as found at the time of facility closure.

The Project would comply with the requirements of the NPDES through preparation and implementation of a SWPPP and filing of a NOI to comply with the Construction General Permit. The plan would include procedures to be followed during construction to prevent erosion and sedimentation, nonstormwater discharges, and contact between storm water and potentially polluting substances.

Decommissioning and site reclamation would likely be staged in phases, allowing for a minimal amount of disturbance and requiring minimal dust control and water usage. It is anticipated that water usage during decommissioning and site reclamation would not exceed operational water usage.

Due to the lack of groundwater use anticipated for the Project in comparison with the overall groundwater withdrawal rate for Tennessee of 470 million gallons per day (Mgal/d; USGS 2010), impacts to the local aquifer and groundwater in general are not anticipated. The use of BMPs and a SWPPP would reduce the possibility of any on-site hazardous materials reaching the groundwater during operations or maintenance. Overall, impacts to groundwater are not anticipated to be significant.

Indirect beneficial impacts to groundwater could occur if panel placement and/or the use of buffer zones leads to fewer pollutants and erosion products entering groundwater. Currently most of the on-site land use is pasture, which provides for the possibility of fertilizer and pesticide runoff entering groundwater. The construction and operation of the Proposed Action could eliminate the source of these damaging impacts, resulting in a beneficial, though minor, indirect impact to groundwater.

Surface Water

During the facility design process, care was taken to avoid streams and wetlands. Complete avoidance was not feasible and the construction and operation of the Project would directly affect one stream (Stream 5) and three wetlands (Wetlands 2, 4, and 7) on the project site. The solar panel array racks would be mounted on metal pilings pushed into the ground with no footer. These pilings would not constitute a wetland fill from the perspective of USACE but are regulated by TDEC. Approximately 134 piles will be placed in Wetland 4 and an additional 47 piles would be placed in Wetland 2. Each individual pile will be no larger than a W6x15 I-beam, which has 6-inch by 6-inch dimensions. Based on a total of approximately 181 piles, the total area of wetland impact associated with pilings would be 0.001 acre (45 square feet). Permanent impacts to wetlands associated with placement of pilings within wetlands total approximately 0.0003 acre of Wetland 2 and 0.0007 acre of Wetland 4. No pilings would be placed in streams. Efforts were made to avoid placing access roads within wetland areas whenever practicable. The proposed gravel access road network has been designed to avoid crossing jurisdictional waters (Figure 16). The proposed distribution line would span one stream (Figure 15).

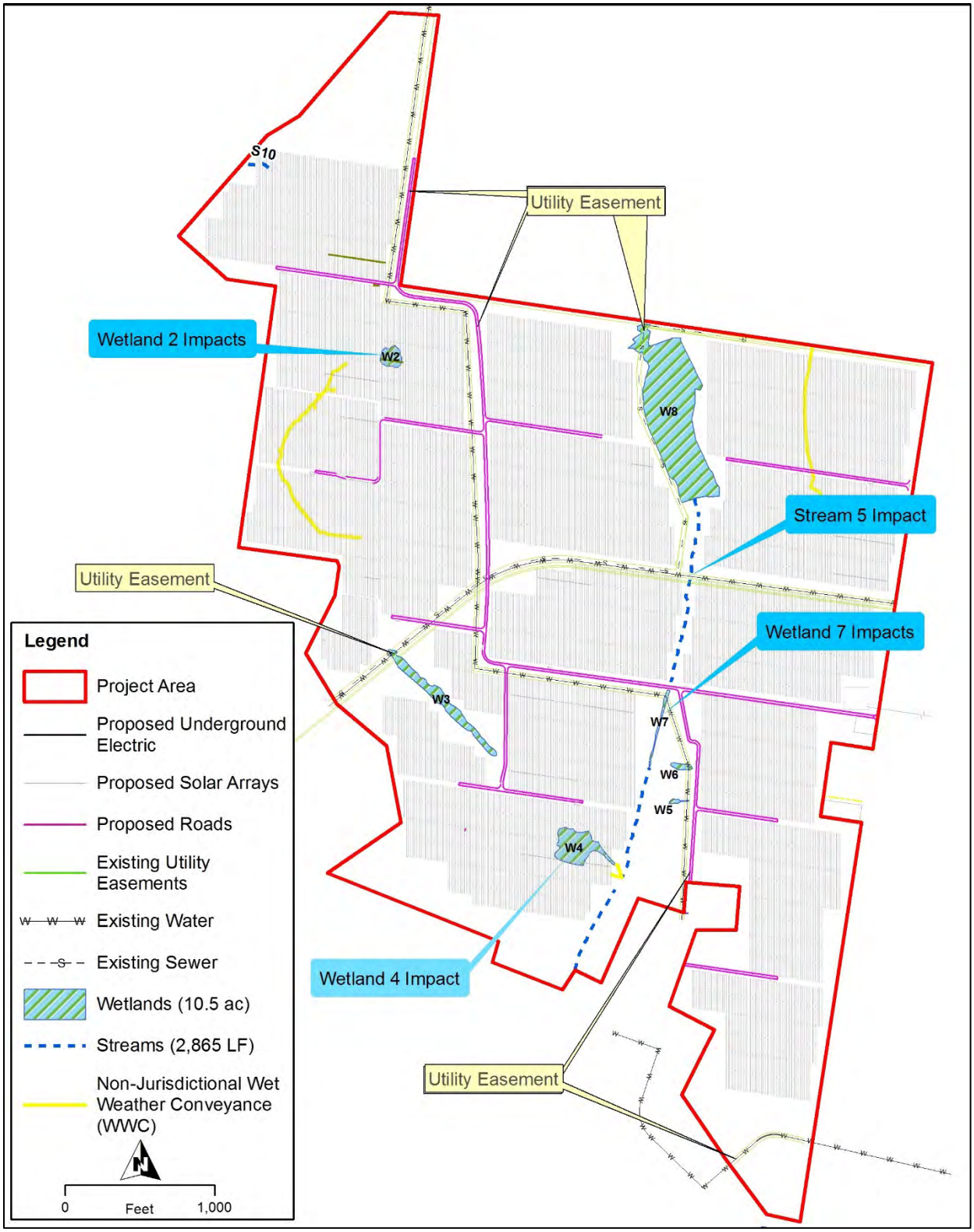

Figure 16. Impacts to waters of the U.S. on the project site.

Temporary wetland impacts resulting from trench excavation associated with the placement of buried electrical cables have also been minimized to the greatest extent possible. Proposed trenching for buried electrical cables would temporarily impact Stream 5, which is approximately 3 feet wide at the site of the proposed trenching, and would result in less than 0.00002 acre (less than 1 square foot) of impacts. Trenching would also result in approximately 0.003 acre of temporary impacts to Wetland 7 (Figure 16). Temporarily affected areas will be returned to their preconstruction grade and will not constitute a loss of wetlands. Existing water and sewer lines cross Stream 5, Wetland 3, Wetland 5, Wetland 6, and Wetland 7 and would not result in additional impacts (Figure 3 and Figure 16). These impacts would be subject to the conditions of the Section 404 and TDEC ARAP permits described in Section 1.4. Mitigation is not required in accordance with the NWP 51 general conditions.

Impact to these wetlands and streams would be minimized by placing supporting structures, including distribution line poles, outside of the sensitive areas.

During construction, runoff of sediment and pollutants could reduce surface water quality in Stream 5 and the WWCs. The potential impacts to surface water would be minimized through the use of BMPs for controlling soil erosion and runoff, such as the use of a 30-foot-wide buffer zone along Stream 5 and the unaffected wetlands, the installation of silt fences, and storm water retention ponds. Additionally, construction of on-site storm water detention ponds would allow sediments to settle out prior to release from the pond. Therefore, through the use of BMPs and avoidance measures, impacts to surface water during construction would be minor. The operation and maintenance of the solar facility would have little impact on surface water and BMPs would be used during any maintenance activities with the potential to cause runoff of sediment and pollutants.

Transmission Line

The proposed TVA transmission line would span 33 surface water features (6 ephemeral/WWCs, 7 perennial streams, 1 pond, and 19 wetlands). Impacts to these wetlands, pond, and streams in the project area would be minimized by placing supporting structures outside of the sensitive areas.

A total of 5.67 wetland acres are located within the proposed Shelby-Drummonds TN 161kV corridor, of which 3.34 acres are farmed, 0.34 acre is emergent, 0.33 acre is scrub shrub, and 1.66 acre are forested. No permanent wetland fill associated with structure placement is proposed; therefore, all wetlands located on the transmission line ROW corridor would be spanned by the overhead wires with all structures located outside the delineated wetland boundaries. However, the woody vegetation comprising 1.66 acre of forested wetland and 0.33 acre of scrub-shrub wetland habitat would be cleared to accommodate conductor spans. Therefore, permanent conversion of the forested and scrub-shrub wetland acreage (1.99 acres) to emergent, wet-meadow habitat would take place.

The scrub-shrub wetlands on the ROW consisted of tree seedlings and saplings, representing a younger version of forested wetlands that would achieve forest stature if left undisturbed. Woody vegetation comprising forested and scrub-shrub wetlands have deeper root systems and

contain greater biomass (quantity of living matter) per area than emergent wetlands which are relatively lower stature and generally devoid of woody vegetation. As a result, forested and scrub-shrub wetlands tend to provide higher levels of wetland functions, such as sediment retention, carbon storage, and pollutant absorption and transformation (detoxification). Consequently, the clearing and conversion of woody wetlands to lower-growing emergent habitat reduces some wetland functions that support healthier or improved downstream water quality (Wilder and Roberts 2002; Ainslie et al. 1999; Scott et al. 1990). Therefore, the permanent conversion of 1.66 acre of forested wetland and 0.33 acre of scrub-shrub wetland (totaled across W003, W005, W006, W010, W011, W012, W013, W015, W017a&b, W018, and W019) would result in degradation of wetland function. However, the forested and scrub-shrub wetlands in the project footprint currently provide low to moderately low functions and values. Their functional capacity is limited primarily by their size, lack of natural buffer, and occurrence within a highly agricultural landscape. These existing limitations to functional capacity would remain unaltered with habitat conversion.

These wetland impacts are subject to USACE Memphis District and TDEC regulatory oversight to ensure no net loss of wetland resources. The USACE/TDEC regulatory mission under Clean Water Act Section 404/401 obligates permitted activities to have no more than minimal impacts to the aquatic environment. Therefore, TVA would comply with all USACE/TDEC regulations, including mitigation as required, to ensure the proposed wetland impacts associated with this project are insignificant.

All wetland areas located within the ROW would be subject to periodic vegetation management to maintain low stature habitat and accommodate transmission line clearance. TVA would minimize wetland disturbance during construction and maintenance via no-mechanized clearing in wetlands, use of low ground pressure equipment, or use of mats during clearing and construction activities to minimize rutting to less than 12 inches and reduce soil compaction (TVA 2017a).

As a result of proposed best management practices in place during construction and fulfilling USACE and TDEC regulatory requirements, the transmission line project would have no significant adverse impacts to wetland areas or to the associated wetland functions and values provided within the general watershed.

The proposed transmission line and supporting structures, would be designed to avoid surface waters and BMPs would be implemented as necessary. Ground disturbance would be minimized, and all work would be conducted in accordance to BMPs, as outlined in state and local regulations. Soil erosion and sedimentation can clog small streams 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 NPDES Construction General Permit from TDEC would be needed if more than 1 acre is disturbed. This permit also requires the development and implementation of a SWPPP. The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize storm water impacts. Since

project activities would be within some areas of sediment impairment additional requirements would be required (see subpart 1.3 and 5.4 of the TDEC Construction General Permit for details), such as additional vegetated buffer zones, different SWPPP sign off requirements, and additional design storm requirements.

TVA routinely includes precautions in the design, construction, and maintenance of its transmission line 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.

TVA would apply for and obtain an ARAP from TDEC for any stream alterations within the proposed transmission line ROW and/or a Section 404 NWP from USACE if construction activities result in the discharge of dredged or fill material into Waters of the U.S., as discussed in Sections 1.4.1 and 1.4.2.

The Proposed Action is consistent with the requirements of E.O. 11990, Protection of Wetlands. Complete avoidance of waters of the U.S. is not possible in order to fulfill the intent of the project purpose and need. Alternative layouts were considered, but in order to meet the project purpose, there is no practicable alternative to constructing in wetlands. Wetlands were avoided to the maximum extent practicable and direct and indirect impacts were minimized with the use of BMPs, including buffers.

As described above for groundwater, minor beneficial, indirect impacts to surface water could result from the change in land use and the reduction in the amount of fertilizer and pesticide runoff to surface water resources, the reduced likelihood of erosion and sedimentation, and the reduction of the disturbance regime on the project site. Improper use of herbicides to control vegetation on the project site, including the transmission line and distribution line corridors, could result in runoff to streams and subsequent aquatic impacts. Therefore any pesticide/herbicide use as part of construction or maintenance activities would have to comply with the 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 be expected to have minor impacts to surface waters.

Floodplains

According to Shelby County, Tennessee, Flood Insurance Rate Map (FIRM) Panel 47157C0180G, the 438-acre project site would avoid the 100-year floodplain, which would be consistent with E.O. 11988. FEMA FIRM panels 47157C0180G, 47157C0185F and 47157C0070F indicate that the transmission line feeding the project site would span a portion of

the Big Creek and Casper Creek floodplains (Figure 15). Transmission lines are considered to be repetitive actions in the 100-year floodplain that are approvable provided floodplain impacts are minimized. To minimize adverse impacts, the project would be constructed in accordance with the TVA subclass review for transmission line location in floodplains and standard BMPs would be used during construction. Based on adherence to the subclass review for transmission line location in floodplains and implementation of standard BMPs, the Proposed Action would have no significant impact on the natural and beneficial functions of floodplains.

3.4 BIOLOGICAL RESOURCES

This section describes an overview of existing biological resources within the project area and the potential impacts to biological resources that would be associated with the No Action and Proposed Action Alternatives. The following components of biological resources are analyzed below: vegetation, wildlife, and rare, threatened, and endangered species.

The Project is located in Shelby County, Tennessee in the city of Millington, within the Loosahatchie watershed. This area lies within the Mississippi Valley Loess Plains Level III Ecoregion which contains two Level IV subecoregions. The Project is located within the Loess Plains subecoregion. The Loess Plains are characterized by gently rolling, irregular plains, 250 to 500 feet in elevation with loess up to 50 feet thick. The region is a large producer of agricultural products, including soybeans, cotton, corn, milo, and sorghum crops in addition to livestock and poultry. Woodlands consist of Oak-hickory and southern floodplain forests, though they are disconnected due to the large amount of cropland. Cypress-gum swamp habitat remains present in some swamp and wetland areas (USEPA 2017a).

A desktop survey was performed prior to field investigations of the proposed project area. Wildlife, vegetation, and threatened and endangered (T&E) species were researched during the desktop survey and verified through the field investigations on November 1 and 2, 2016. Field investigations for the proposed transmission line were conducted in August 2017. Results of desktop investigations and field evaluations are described in this section.

Biological resources are regulated by a number of federal laws. The laws relevant to the Proposed Action include:

- The National Environmental Policy Act (42 U.S.C. §§ 4321-4347);
- The Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544);
- Responsibilities of Federal Agencies to Protect Migratory Birds (Executive Order 13186)
- The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712) (for actions of nonfederal entities); and
- The Bald and Golden Eagle Protection Act.

Desktop research with TVA Natural Heritage Database, TDEC, and the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) was conducted to obtain the current county list and a preliminary list of known occurrences of T&E species in Shelby County. TVA must consult with USFWS if there is a potential to affect species listed under the

ESA. Depending on the nature of potential impacts to listed species, consultation may be informal or formal. Formal consultation is required if the Proposed Action has the potential to adversely affect listed species or their critical habitat. Based on the findings below, formal consultation would not be required for the Proposed Action.

3.4.1 Affected Environment

The existing biological resources in the project site include natural areas, vegetation and wildlife, as well as potential for rare, threatened, or endangered species. One natural area is within the proposed project footprint. No other natural areas are within 3 miles of the proposed Project. NSA Mid-South in Millington, Tennessee, is a 1,600+ acre base of the United States. A part of the Navy Region Southeast and the Navy Installations Command, NSA Mid-South serves as the Navy's Human Resources Center of Excellence. Most of the NSA Mid-South facility has been extensively altered by various activities over several decades and few relatively undisturbed biotic communities exist. The area is managed in accordance with the NSA Mid-South's Integrated Natural Resources Management Plan (INRMP) to develop functioning, sustainable ecological communities while ensuring the successful accomplishment of the installation's mission.

3.4.1.1 Vegetation

The Loess Plains subecoregion is typically characterized by oak-hickory-pine forests and open croplands. The forests are characterized by a broad diversity of trees, including northern red oak (*Quercus rubra*), pignut hickory (*Carya glabra*), white oak (*Quercus alba*), and mockernut hickory (*Carya tomentosa*) (Griffith et al 1998). Vegetation on the project site has been altered from this typical forest community. The project site has been cleared for farming and was previously used for grazing, but has been inactive for the past 5 to 10 years. The project site contains approximately 90 acres of trees or forested land and approximately 300 acres of fallow pasture. Most of the trees on the project site are located along the western and southern boundaries and in the wetland areas in the northeastern portion of the project site.

The predominant species in the forested portions of the project area and the proposed electrical line corridors consist of southern red oak (*Quercus falcata*), black oak (*Quercus velutina*), slippery elm (*Ulmus rubra*), box elder (*Acer negundo*), and flowering dogwood (*Cornus florida*). Sawtooth blackberry (*Rubus argutus*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*) predominates in the understory and in old field areas within the project site. Vegetation in the maintained pastureland is dominated by tall fescue (*Schedonorus arundinaceus*), broomsedge bluestem (*Andropogon virginicus*), white clover (*Trifolium repens*), and foxtail grass (*Setaria* sp.). In addition to tall fescue, invasive species observed on site include Chinese privet *(Ligustrum sinese),* mimosa (*Albizia julibrissin*)*,* Nepalese browntop *(Microstegium vimineum),* Japanese honeysuckle (*Lonicera japonica*)*,* and multiflora rose (*Rosa multiflora*). The proposed Navy distribution line would cross predominantly grassy areas and narrow treelines. No uncommon plant communities are known from the vicinity of the project area and no rare plant communities were seen in photographs and in aerial photography. The site has no conservation value.

The biological survey for the solar facility site was conducted during winter months which prohibited full identification of all plants on site. The survey of the transmission line was conducted in August 2017.

The landscape directly surrounding the project footprint is a combination of mixed mesophytic forests, wetlands, pasture and agricultural fields, roads, and existing transmission line ROWs. The majority of the proposed transmission line is routed through agricultural fields and pastures (54 acres) and forest fragments (6 acres). Forest fragments in the project footprint exist mainly along drainage ditches or creeks and are made up of deciduous forests consisting of sugarberry, cottonwood, sycamore, overcup oak, black willow, black walnut, shellbark hickory, and black willow. Each of the varying community types offers suitable habitat for species common to the region both seasonally and year-round.

3.4.1.2 Wildlife

Oak-hickory forests typically found in the Southeastern Plains and Hills support a variety of mammals, including gray squirrel, fox squirrel, and eastern chipmunk. Other common mammals occurring within the ecoregion include white-tailed deer, eastern cottontail, and raccoons (USFWS 1995). Game birds in the region include the wild turkey and mourning dove.

Many of these species are likely to be found in the forested areas near the southern and northwestern boundaries of the project site; however, as the majority of the project site is actively mowed, overall species diversity is low and most species that were present during the field visit, such as white-tailed deer, gray squirrel, and eastern cottontail, are widespread and relatively common in the area.

Deciduous forests provide habitat for an array of terrestrial animal species. Birds found in this habitat are chuck-will's-widow, downy woodpecker, eastern screech-owl, red-tailed hawk, white-breasted nuthatch, wood thrush, and yellow-billed cuckoo (National Geographic 2002). This area also provides foraging and roosting habitat for several species of bats, particularly in areas where the forest understory is more open. Some examples of bat species likely found within this habitat are big and little brown, eastern red, evening, hoary, Rafinesque's big-eared, silver-haired, and tricolored bat. Coyote, eastern chipmunk, eastern woodrat, North American deermouse, and woodland vole are also mammals likely to be present within this habitat (Kays and Wilson 2002). Gray ratsnake and midland brownsnake as well as scarlet kingsnake are all common reptiles of this habitat (Conant and Collins 1998). In forest sections with aquatic features, amphibians likely found in the area include dusky, marbled, mole, and spotted salamanders as well as barking and Cope's gray treefrogs (Conant and Collins 1998, Niemiller et al. 2011).

Wetland habitat provides resources for such birds as prothonotary warbler, northern harrier, red-winged blackbird, song sparrow, swamp sparrow, and white-throated sparrow (National Geographic 2002). Mammals that may utilize this habitat are American beaver, eastern harvest mouse, marsh rice rat, muskrat, nutria, and swamp rabbit (Kays and Wilson 2002). Eastern black kingsnake, eastern ribbonsnake, common gartersnake, midland watersnake, and gray ratsnake are all wetland reptiles (Conant and Collins 1998). Eastern red-spotted newt and three-

lined salamanders as well as American bullfrog, bird-voiced treefrog, green frog, northern cricket frog, pickerel frog, and southern cricket frog are examples of some amphibians that are likely present (Niemiller et al. 2011).

Pasture and agricultural fields offer habitat to a multitude of species such as blue grosbeak, brown-headed cowbird, brown thrasher, common grackle, common yellowthroat, dickcissel, eastern bluebird, eastern kingbird, eastern meadowlark, eastern towhee, field sparrow, grasshopper sparrow, house finch, northern mockingbird, and prairie warbler among others (National Geographic 2002). Mammals likely present in this habitat include eastern cottontail, eastern harvest mouse, eastern woodrat, hispid cotton rat, red fox and striped skunk (Kays and Wilson 2002). Reptiles with the potential to occur in the project area are eastern milk, gray ratsnake, smooth earth snake and southern black racer, as well as eastern slender glass lizard (Conant and Collins 1998).

Review of the TVA Regional Natural Heritage database on July 31, 2017, indicated that no caves occur within 3 miles of the project footprint and no caves were observed during the field review. No other unique or important terrestrial habitats exist on the project site.

According to the TVA Heritage database, no aggregations of migratory birds or colonial wading bird colonies are known from the project area. The nearest wading bird colony occurs approximately 8.6 miles from the project area and would not be affected by the Proposed Actions. No other unique habitats were identified during the field review.

Migratory Birds

The USFWS IPaC report identified 20 species of migratory birds of concern (i.e., birds of conservation concern, which are species not already federally listed that represent USFWS' highest conservation priorities) that have the potential to occur in the vicinity of the proposed project site. These species are listed in Table 5. Suitable habitat for a number of these species may occur along the fragmented forest edges and brushy areas throughout the site. Some may also use grassland habitats, which are present on the site, for foraging. Bald eagles are federally protected under the Bald and Golden Eagle Protection Act and are monitored, but not likely to be found in or around the project site. Those birds that may occur in the project area include the chuck wills widow, fox sparrow, Mississippi kite, prairie warbler, short-eared owl, Swainson's warbler, willow flycatcher, wood thrush, worm-eating warbler, dickcissel, and loggerhead shrike. Other migratory birds not on the USFWS list of species of concern but common in the area include the blackbirds, eastern meadowlark, field sparrow, savannah sparrow (in winter), and indigo bunting (in summer). Common songbirds that may occur in the area are the rose-breasted grosbeak during migratory periods, red-eyed vireo, common yellowthroat, blue jay, and summer tanager (USFWS 1995).

Table 5. Migratory bird species of concern potentially occurring in the vicinity of the project area.

Species	Seasonal occurrence in project area
Bald eagle (*Haliaeetus leucocephalus)*	Year-round
Cerulean warbler *(Dendroica cerulea)*	Breeding
Chuck-will's-widow (*Caprimulgus carolinensis)*	Breeding
Dickcissel (*Spiza americana)*	Breeding
Fox sparrow (*Passerella iliaca)*	Wintering
Kentucky warbler (*Oporornis formosus)*	Breeding
Le Conte's sparrow *(Ammodramus leconteii)*	Wintering
Least bittern (*Ixobrychus exilis)*	Breeding
Loggerhead shrike (*Lanius ludovicianus)*	Year-round
Mississippi kite *(Ictinia mississippiensis)*	Breeding
Prairie warbler *(Dendroica discolor)*	Breeding
Prothonotary warbler *(Protonotaria citrea)*	Breeding
Red-headed woodpecker *(Melanerpes erythrocephalus)*	Year-round
Rusty blackbird (*Euphagus carolinus)*	Wintering
Sedge wren *(Cistothorus platensis)*	Migrating
Short-eared owl *(Asio flammeus)*	Wintering
Swainson's warbler *(Limnothlypis swainsonii)*	Breeding
Willow flycatcher *(Empidonax traillii)*	Breeding
Wood thrush *(Hylocichla mustelina)*	Breeding
Worm eating warbler *(Helmitheros vermivorum)*	Breeding

***Source**:* USFWS 2015a

3.4.1.3 Rare, Threatened, and Endangered Species

Rare, threatened and endangered species are regulated by both the federal and state governments (see Section 3.4). Desktop research with TDEC, USFWS, and TVA Heritage database revealed four federally listed species and one federally delisted species that is still monitored by USFWS in Shelby County, Tennessee (Table 6). Several more species of plants and animals reported from Shelby County and/or within 10 miles of the project site are listed by the State of Tennessee as endangered, threatened, in need of management, or of special concern (Table 7). It is unlawful to take, capture or kill many of these species (TWRA 2015). Review of the TVA Natural Heritage Database (September 5, 2017) indicated records of five state-listed aquatic animal species (three fish and two mussels) within Shelby County and/or within a 10-mile radius of the project area. Designated critical habitat for aquatic or terrestrial species does not occur within the project area, the Big Creek (0801020903) 10-digut HUC watershed, or in Shelby County. A May 2, 2017 query of the TVA Natural Heritage Database indicates that no federally listed or state-listed plant species are known from within 5 miles of

the proposed transmission line project area and no habitat capable of supporting state or federally listed plant species occurs in the project area.

A review of terrestrial animals in the TVA Regional Heritage database on August 4, 2017 indicated a record for one state-listed species (northern pine snake), but no federally listed or federally protected species within 3 miles of the project footprint. Records for five federally protected species (bald eagle, Indiana bat, interior least tern, northern long-eared bat, and piping plover) exist within Shelby County, Tennessee. Thus, a review of habitat suitability has been included for all of these sensitive species.

Federally Listed Species

A desktop database search and aerial/street-view photograph review was conducted to identify the types of habitats present on the proposed project site, including habitats that potentially could support listed species. The federally listed or protected species that were identified as having the potential to occur in the area are the bald eagle, Indiana bat, interior least tern, northern long-eared bat, and piping plover. No designated critical habitats are present in the project area (USFWS 2017).

Table 6. Federally listed species

Scientific name	Common name	Federal status	Habitat
Mammals			
Haliaeetus leucocephalus	Bald eagle	Delisted and monitored	Areas close to large bodies of water; roosts in sheltered sites in winter; communal roost site
Myotis sodalis	Indiana Bat	Endangered	Various habitats including wet meadows, damp woods, and uplands; statewide.
Sternula antillarum athalassos	Interior least tern	Endangered	Mississippi River sand bars and islands, dikes; open habitat avoiding thick vegetation. Sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, salt flats.
Myotis septentrionalis	Northern long-eared Bat	Threatened	Various habitats including wet meadows, damp woods, and uplands; statewide.
Charadrius melodus	Piping plover	Endangered	Wide, flat, open, sandy beaches with very little grass or other vegetation.

Source: USFWS 2017

A survey of biological resources on the project site was conducted by HDR on November 1 and 2, 2016. The survey focused on the general characteristics of the land cover, vegetation communities, and wildlife habitats currently present within and adjacent to the site and, in particular, to support a preliminary evaluation of the potential for special status species, listed below, to occur on the site. Field surveys of the proposed transmission line route were conducted on August 2, 2017.

Bald eagle

Bald eagles are protected under the Bald and Golden Eagle Protection Act and while they have been delisted from the ESA, they are federally monitored. This species is associated with large mature trees capable of supporting their massive nests. These are usually found near large waterways where the eagles forage. While there is a small farm pond on the solar facility site, there are no large bodies of water present in the project area that are likely to support bald eagles, and no bald eagles or evidence of bald eagle nests were seen during the site investigations. No suitable habitat for bald eagles exists within the project footprint or in the immediate vicinity. Therefore, it is unlikely that the bald eagle would be found in or around the project site.

Indiana bat

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 in mature forests with an open understory often near sources of water. 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 2017). The endangered Indiana bat hibernates in caves and mines in winter and migrates to summer habitats in wooded areas. The large winter colonies disperse in spring, and reproductive females form smaller maternity colonies in wooded areas. Males and nonreproductive females roost in trees but typically do not roost in colonies. The range of the Indiana bat extends from the northeast through the east-central United States (USFWS 2015a). The Indiana bat typically forages in partially open forested habitats and forest edges as well as riparian areas along river and lake shorelines (NatureServe Explorer 2016). Suitable summer roosting habitat requires dead, dying, or living trees over 5 inches in diameter with sufficient exfoliating bark; multiple roost sites are generally used. Primary summer roosts are typically behind the bark of large, dead trees, particularly those that are in gaps in the forest canopy or along forest edges so that they receive sufficient sun exposure (USFWS 2015a). Foraging habitat exists throughout the proposed action area over streams, forest fragments, fence rows, and other corridors. Though records of Indiana bat are known from Shelby County, Tennessee, the exact locations are unknown (Tennessee Bat Working Group). Field reviews determined that forested areas within the project area provide potentially suitable summer roosting and foraging habitat for Indiana bat based on presence of snags and trees with exfoliating bark. Two trees representing suitable summer roosting habitat were found in the project footprint of the proposed transmission line. Both trees were snags that appeared to be hollow and exhibited multiple cracks and crevices or suitable exfoliating bark. No suitable habitat was observed within the proposed distribution line corridor. No caves are known to occur or were observed during field reviews within the project site or the distribution line corridor. Three bunkers and a number of barns and other structures would be demolished in association with the Proposed Action. These structures were evaluated for habitat suitability during field reviews. Due to lack of access and egress points the on-site bunkers do not provide suitable habitat for Indiana bat. Suitable

summer roosting habitat may exist within some of the barns located on-site. Winter roosting habitat does not exist within the project area.

Bat species inventory surveys were conducted on August 10, 2016 and August 11, 2016 by BWSC in cooperation with the Jackson Group to inventory bat species that may be present in the solar facility project area. The surveys were conducted in accordance with USFWS guidance with the purpose of establishing the presence or probable absence of the Indiana bat and the northern long-eared bat (BWSC 2016; Appendix F). No federally threatened or endangered bats were captured during the bat species inventory survey.

Interior least tern

Interior least terns are associated with rivers and reservoirs with open, sparsely vegetated sand and gravel beaches, sandbars, islands, and salt flats. This species is highly adapted to nesting in disturbed areas, using ash disposal ponds, gravel pits, and reservoir shorelines. They forage in the shallow waters of lakes, ponds, and rivers near nesting sites. During migration, least terns can be seen on lakes and along large rivers throughout Tennessee. The closest record of an interior least tern is from an ash pond 12.8 miles from the project footprint. No suitable habitat for least tern exists in the project footprint.

Northern long-eared bat

The northern long-eared bat (NLEB) 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, NLEBs roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. Roost selection by NLEB is similar to Indiana bat; however it is thought that NLEBs are more opportunistic in roost site selection. This species has also been documented roosting in abandoned buildings and under bridges. NLEBs emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (Harvey et al. 2011; USFWS 2014; USFWS 2017). Foraging habitat exists throughout the Proposed Action area in forest fragments and over streams. Though records are known from Shelby County, Tennessee, the exact locations are unknown (Tennessee Bat Working Group 2017). No known winter habitat for northern long-eared bat exists in the project area. Two trees representing suitable summer roosting habitat were found in the proposed transmission line project footprint. Both trees were snags that appeared to be hollow and exhibited multiple cracks and crevices or suitable exfoliating bark. No suitable habitat was observed within the proposed distribution line corridor.

No caves are known to occur or were observed during field reviews within the project action area. Three bunkers and a number of barns and other structures would be demolished in association with the Proposed Action. These structures were evaluated for habitat suitability during field reviews. Due to lack of access and egress points the on-site bunkers no not provide suitable habitat for NLEB. Suitable summer roosting habitat may exist within some of the barns located on site. Winter roosting habitat does not exist on the site. Field reviews determined that forested areas within the project area provide potentially suitable summer roosting and foraging

habitat for NLEB based on presence of snags and trees with exfoliating bark. Bat species inventory surveys were conducted on August 10, 2016 and August 11, 2016 by BWSC in cooperation with the Jackson Group to inventory bat species that may be present in the solar facility project area. The surveys were conducted in accordance with USFWS guidance with the purpose of establishing the presence or probable absence of the Indiana bat and the northern long-eared bat (BWSC 2016; Appendix F). No federally threatened or endangered bats were captured during the bat species inventory survey.

Piping plover

Piping plovers breed on the Atlantic coast, Great Lakes, and northern Great Plains. Nonbreeding habitat is usually on beaches, sand bars, and algal flats in protected bays. They forage for invertebrates in open areas, avoiding vegetation. Piping plovers are a very rare spring migrant and uncommon fall migrant in Tennessee. The closest record of piping plover is about 17 miles to the south at Shelby Farm Park in Memphis. No suitable habitat for piping plovers exists within the project footprint.

State-Listed Species

State-listed animal and plant species reported in Shelby County, Tennessee and/or within a 10-mile radius of the Project site are shown in Table 7. These species include two mammals, nine birds, one reptile, two amphibians, four fish, an insect, three mollusks, and eleven plants that are endangered, threatened, or deemed in need of management. None of the federally listed species discussed above were included on the state list.

Table 7. State-listed species occurring in Shelby County, Tennessee.

Scientific name	Common name	Federal status	State status/rank	Habitat
Mammals				
Neotoma floridana illinoensis	Eastern woodrat	--	D/S3	Various habitats including wet meadows, damp woods, and uplands; rocky areas, under rocks and boulders; statewide.
Sorex longirostris	Southeastern shrew	--	D/S4	Various habitats including wet meadows, damp woods, and uplands; forests, scrub, shrub, brushlands; statewide.
Birds				
Tyto alba	Barn owl	--	D/S3	Open and partly open country, often around human habitation; farms; isolated timber stands.
Vireo bellii	Bell's vireo	--	Rare, not state listed	Thickets adjacent to water, bottomlands; west Tennessee and one confirmed location in Western Highland Rim.

Scientific name	Common name	Federal status	State status/rank	Habitat
Thryomanes bewickii	Bewick's wren	--	E/S3	Brushy areas, thickets and scrub in open country, open and riparian woodland.
Dendroica cerulea	Cerulean warbler	--	D/S3B	Mature deciduous forest, particularly in floodplains or mesic conditions.
Chondestes grammacus	Lark sparrow	--	T/S1B	Open habitats with scattered bushes and trees, prairie, cultivated areas, fields with bushy borders; ground nesting.
Ictinia mississippiensis	Mississippi kite	--	D/S2S3	Undisturbed stands of lowland and floodplain forests and along major rivers.
Limnothlypis swainsonii	Swainson's warbler	--	D/S3	Mature, rich, damp, deciduous floodplain and swamp forests.
Reptiles				
Pituophis melanoleucus melanoleucus	Northern pine snake	--	T/S3	Various habitats including Pine barrens, abandoned fields, dry mountain ridges. Associated with pocket gophers and gopher tortoise borrows. Sandy, infertile soils.
Amphibians				
Hyla gratiosa	Barking treefrog	--	D/S3	Low wet woods and swamps esp. with ephemeral ponds.
Acris gryllus	Southern cricket frog	--	D/S3	Grassy margins of swamps, marshes, lakes, ponds, streams, ditches, and nearby temporary pools; far southwest Tennessee.
Fishes				
Notropis dorsalis	Bigmouth shiner	-	D/S1	Shallow, swift moving streams. Shallow pools of headwaters, small to medium rivers with sandy bottoms.
Cycleptus elongatus	Blue sucker	--	T/S2	Swift waters over firm substrates in big rivers.
Ammocrypta beani	Naked sand darter	--	D/S2	Shifting sand bottoms and sandy runs; Hatchie and Wolf rivers and their larger tributaries.
Noturus	Northern	-	D/S3	Stream riffles over loosely-

Scientific name	Common name	Federal status	State status/rank	Habitat
stigmosus	madtom			packed gravel, sand, or rock substrates with a strong current.
Noturus gladiator	Piebald madtom	--	D/S3	Large creeks and rivers in moderate-swift currents with clean sand or gravel substrates; Mississippi River tributaries.
Mollusks				
Lampsilis siliquoidea	Fatmucket	--	D/S2	Slackwater with mud substrate.
Oboraria jacksoniana	Southern hickorynut	--	D/S2	Rivers with medium-sized gravel substrates and low-mod current; Wolf and Hatchie rivers; Mississippi River watershed.
Webbhelix multilineata	Striped whitelip	--	Rare, not state listed	Low wet habitats, marshes, floodplains, meadows; lake margins; under leaf litter or drift; Mississippi River floodplain.
Insects				
Lycaena hyllus	Bronze copper	--	Rare, not state listed	Marshes, sedge meadows, moist to wet grassy meadows, ditches, fens, streamside or pondshore wetlands, or roads and ROWs through marshlands; west Tennessee.
Plants				
Panax quinquefolius	American ginseng	--	S-CE/S3S4	Rich woods; full shade environments in deciduous forests
Schisandra glabra	Bay starvine	-	T/S2	Heavily wooded hillsides
Ulmus crassifolia	Cedar elm	--	S/S2	Swamps
Iris fulva	Copper iris	--	T/S2	Bottomlands
Hottonia inflata	Featherfoil	--	S/S2	Wet sloughs and ditches
Carex oxylepis var. *pubescens*	Hairy sharp-scaled sedge	-	-	Slope, deciduous woods
Rhynchospora harveyi	Harvy's beakrush	--	T/S1	Barrens and other open areas
Heteranthera multiflora	Multiflowered mud-plantain	--	S/S1	Shallow water, mud flats
Silene ovata	Ovate catchfly	--	E/S2	Open oak woods
Schisandra	Red starvine	--	T/S2	Rich mesic woods, bluffs

Scientific name	Common name	Federal status	State status/rank	Habitat
glabra				
Symphyotrichum praealtum	Willow aster	--	E/S1	Moist prairies and marshes, moist roadsides

Status abbreviations:

E – Endangered; T – Threatened; D – Deemed in Need of Management; CE – Commercially Exploited; S – Special Concern; LE - Listed Endangered
Rank codes:
S1 – Critically impaired; S2 – Imperiled; S3 –Vulnerable; S4 – Widespread, abundant, and apparently secure within the state, but with cause for long-term concern

Source: TDEC Natural Heritage Program Rare Species by County (TDEC 2017); TVA 2017c

The project area contains suitable habitat for several state-listed species. The listed terrestrial species that could occur in the habitat types present on the site include two mammals—the southeastern shrew and eastern woodrat. The project area provides a limited amount of potential suitable habitat for the barn owl in the structures and hollow trees on the site and Bewick's wren and lark sparrows in the unmowed grassy areas along the edges of the fields. Bewick's wren and lark sparrow habitat is typically in open habitats with scattered bushes, thickets, trees, and cultivated areas. Project development would occur in areas which have been used as pastureland as well as small forested areas with limited clearing. Fringe brush and undeveloped areas of the project site which will be retained, would provide potential habitat for Bewick's wren and the lark sparrow. Habitat for northern pine snake exists in the project area in abandoned fields. Potential habitat exists for the southern cricket frog and bronze copper along the water and wetland features on site, such as Stream 5 and the farm pond. Suitable habitat for barking treefrog and Swainson's warbler exists in the forested wetland on site. The bigmouth shiner is not expected to be present in the project area due to the lack of quality stream habitat. Additionally, the streams would be avoided during development and protected through BMPs and with buffers to prevent the degradation of any potential habitat. The entire project site has been heavily disturbed by previous land use and there is no habitat present on site for federal or state-listed plant species.

3.4.2 Environmental Consequences

This section describes the potential impacts to biological resources should the No Action Alternative or the Proposed Action Alternative be implemented.

3.4.2.1 No Action Alternative

Vegetation

Under the No Action Alternative, there would be no Project-related impacts to the existing vegetation, including invasive species, on the project area. Over time, it is possible that the grassy areas on the project site could become developed and the forested areas could become cleared if the resident population in the area grows or the land use changes, but these changes are unrelated to the proposed project. The project site will continue to be maintained by mowing

approximately three times per year to comply with MIDB requirements and to prevent the spread of invasive species.

Wildlife

Under the No Action Alternative, there would be no impacts to wildlife on the project area.

Rare, Threatened, and Endangered Species

Under the No Action Alternative, no Project-related impacts to rare, threatened, and endangered species are anticipated because neither the species nor their habitat are present in the action area.

3.4.2.2 Proposed Action Alternative

Under the Proposed Action, direct impacts to vegetation, wildlife, and rare, endangered and threatened species would be anticipated as a result of construction and operation of the Project.

The Proposed Action would directly affect the NSA Mid-South naval facility with the installation of the solar facility and accompanying electrical interconnections. The industrial development of the project area was anticipated during the BRAC process and activities on the 72-acre tract leased from the Navy would be undertaken in accordance with the NSA Mid-South INRMA.

Vegetation

Under the Proposed Action, the proposed solar facility would be constructed on the project site with direct impacts to vegetation. Tall vegetation, including all trees on site (approximately 90 acres), would be removed from the approximately 390 acres of land within the fenced-in area for the PV arrays, electrical components, and access roads. The trees along the property boundaries would be removed to prevent shading and trees within wetlands would be cut down to retain stumps. The remaining approximately 48 acres of the 438-acre project site outside of the fenced-in area would be primarily undisturbed. Some trees outside the fenced-in area would be trimmed for the proposed distribution line, and trees behind the home on Bethuel Road would be removed for the proposed line. Following construction, the graded area within the fencing, as well as areas excavated to install underground wiring and for other purposes, would be seeded with various grasses and the solar facility would be maintained as described in Section 2.2.4 to prevent vegetation from growing taller than about 2 feet. This would result in the long-term conversion of most of the project site from pastureland and forested areas to a mix of grass and herbaceous vegetation. This vegetation would provide foraging habitat for animals such as the eastern cottontail. Implementation of the proposed project would not affect unique or important terrestrial habitat.

Invasive species on site would be eradicated with selective herbicides or graded and cleared. To minimize the introduction and spread of invasive species, standard operating procedures will be followed consistent with E.O. 13112 (Invasive Species) for revegetating with noninvasive plant species. It is likely that project-related construction would result in localized increases of invasive plants, but the plants most likely to colonize the area are distributed widely throughout the region and implementation of the proposed project would not change this situation. Effects would be further reduced because revegetation of the site would be accomplished using native or noninvasive species as outlined in TVA (2017a). The project would not significantly contribute to the spread of exotic or invasive species.

Direct impacts to forested areas would be minimal under the Proposed Action as most of the trees on the project site are narrow treelines located along the project site boundaries. Approximately 90 acres of trees on the project site would be removed or trimmed from the project site. Although not required, construction would be avoided within a 30-foot buffer of the unnamed stream and wetlands to the extent possible, but some work could occur within the buffer. Forested sections of the project would be cleared to create a ROW for the proposed transmission line. Tree removal from the ROW and adjacent to the ROW would be required for the transmission line, as described above in Section 2.2.3.1. Minimal tree trimming would be required for the proposed distribution line as described in Section 2.2.3.2.

Taking into consideration the large amount of similar habitats in the area regionally and locally, the clearing and light grading of the existing vegetation would be considered a minor impact. Most of the project site (approximately 300 acres of the 438-acre site) is fallow pastureland that was formally used for grazing. The surrounding area consists of very similar vegetative habitats and the effects of the conversion of approximately 300 acres of early successional vegetation in this context would be relatively small.

Indirect impacts are possible if the existing vegetation is part of a larger system which relies on these particular plant communities for regional propagation and genetic diversity. Due to the large amount of similar habitat and plant communities surrounding the project area this impact is unlikely or at least would be very minor.

Wildlife

Under the Proposed Action, the proposed solar facility would be constructed on the project site with direct impacts to wildlife habitat. Approximately 90 acres of forested habitat would be cleared within the fenced-in area for the PV arrays, electrical components, and access roads. The removal of forested habitat from the site would have direct and indirect effects on migratory bird and mammal species that currently utilize wooded habitat on the site. This would result in the permanent or temporary displacement of any wildlife (primarily common native or naturalized species) currently using the area. Direct effects to some individuals may occur if those individuals are immobile during the time of habitat loss. This could be the case if activities took place during breeding/nesting seasons.

Habitat loss likely would disperse mobile 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. In the event that the 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. Considering the amount of similar quality habitat in the surrounding area, it is unlikely that any wildlife species would be unable to relocate successfully. Therefore, the proposed project would have minor impacts on populations of common wildlife species.

Rare, Threatened and Endangered Species

The Proposed Action may affect, but is not likely to adversely affect threatened or endangered species. Although potentially suitable habitat for northern long-eared bat and Indiana bat was

identified on the project site, no protected species were identified on the project site during field surveys. Other listed species are not known or likely to occur in the project area.

The project site is predominantly pastureland; no known caves are on or in the vicinity of the site for use as winter hibernacula. Suitable summer foraging and roosting habitat for the Indiana bat and northern long-eared bat occur within the small forested areas, and buildings within the project area. Some potentially suitable foraging or roosting habitat would be affected by the construction and operation of the proposed solar facility and electrical interconnection. Bat species inventory surveys were conducted on August 10, 2016 and August 11, 2016 by BWSC in cooperation with the Jackson Group to inventory bat species that may be present in the solar facility project area. The surveys were conducted to establish the presence or probable absence of the Indiana bat and the northern long-eared bat. Two mist-net sites were surveyed for a total of 9 net-nights (BWSC 2016; Appendix F). No federally threatened or endangered bats were captured during the bat species inventory survey approved by USFWS. Therefore, given the probable absence of federally threatened or endangered bats, project development is not likely to adversely affect bat communities in the project area (BWSC 2016). Some potentially suitable foraging or roosting habitat for the Indiana bat and northern long-eared bat occurs within the small forested areas of the proposed transmission line route. TVA consulted with USFWS on the “not likely to adversely affect” determination and USFWS issued a concurrence letter on November 2, 2017. The proposed distribution line to the Navy facility to the south will follow existing road and utility easements. No suitable habitat for NLEB or Indiana bat was observed along the distribution line route.

No suitable habitat for state or federally listed plant species exists within the project area. Therefore, the proposed project would have no effect on federally listed plants and no impact on state-listed plants. No suitable habitat exists within the project area for state-listed aquatic species. Therefore, the proposed project will have no effect on state-listed aquatic species. No direct impacts to rare, threatened, or endangered species are anticipated from the construction and operation of the proposed solar facility. TVA will take appropriate measures to mitigate impacts to forested bat habitat resulting from the construction and operation of the proposed transmission line and effects on listed species from this part of the Proposed Action would be minor. Overall, the construction and operation of the solar site, the distribution line, and the transmission line is not likely to adversely affect federally listed threatened or endangered species.

3.5 VISUAL RESOURCES

This section describes an overview of the visual resources in and surrounding the project area and the potential impacts on these visual resources that would be associated with the No Action and Proposed Action Alternatives.

3.5.1 Affected Environment

Visual resources are the visual characteristics of a place and include both natural and man-made attributes. Visual resources are important as they can determine how an observer experiences a particular location. For example, an agricultural setting would elicit very different feelings in an observer than a manufacturing plant or an industrial area. Visual resources are very important to people living in the area, people going through an area and in the context of historical and culturally significant settings. The experience of a historically significant building can be severely altered if the surrounding visual character is changed. A viewshed is defined as the environment that can be seen from a certain vantage point, a viewpoint is the vantage point from where the visual character is seen.

The proposed Project is in the city of Millington. The regional character is mostly rural, with agricultural and pasture fields, rolling hills, forested areas, and generally small towns and communities acting as a suburb and support to Memphis. Immediately adjacent to the project site is an airport and golf course. Attributes associated with the city of Millington include many single-family homes which house families supporting NSA Mid-South—a naval station which is supported by approximately 8,500 personnel. The town is surrounded by rolling hills and farmland and, particularly to the south, suburban development on the north side of Memphis.

The project site is mostly fallow pastureland, with dirt roads and small shrub and forested areas present along the edges of the property (Photo 3). The viewsheds constitute a predominantly agricultural setting, with a few manmade attributes, including barns, stables, corrals, fences, storage areas and a farm pond on site formally used for agricultural purposes (Photo 4). Due to the periodic mowing and former agricultural practices, visual appearance is consistent over the years. Photos 3, 4, and 5 illustrate the recently mowed open pasture on the project site. Just prior to mowing, the fields would be filled with areas of tall grasses and weeds, as was observed during the November 2016 site visit (Photo 6). A barn and former horse stables and corrals located on site supported the previous agricultural mission of the project area (Photo 7); several bunkers are on site as remnants of the former military presence (Photo 8). These structures have been abandoned and several areas of the project site have a dilapidated appearance.

Photo 3. Pastureland, private access road, and treelines on the project site.

Photo 4. View of the project site west towards pond, treelines, and former agricultural buildings.

Photo 5. Pastureland with treelines and buildings on site.

Photo 6. View of unmowed fields on site.

Photo 7. Former horse stable located on site.

Photo 8. Former military storage bunker located on site.

The Navy distribution line corridor is within roadway ROW and existing utility easements. The viewshed is mostly maintained, manmade features, including naval housing, landscaping, overhead electrical lines, and a few narrow treelines. The transmission line corridor crosses through mostly croplands and some narrow treelines paralleling existing overhead electrical lines. The viewshed from the proposed transmission line corridor constitutes a mostly agricultural setting. The surrounding project area has a gentle undulating topography of pastureland and cropland. The natural color tones and unobtrusive man-made visual disturbances can create a feeling of harmony and tranquility. Although the uniformity of pastureland and cropland is a man-made visual disturbance, it is still an appealing view due to the colors and topography. The open areas with the adjacent forested areas present an attractive contrast of colors and shapes. A formerly proposed residential development is located to the north of the project site on Bethuel Road. This development was planned for Navy housing and has been abandoned for several years; a narrow forested buffer is located between the formerly proposed development and the project site.

Manmade features on adjoining properties include private residences to the east and south and a golf course to the south. The project site is visible from the golf course, with a narrow forested buffer along the property boundary. Off-site buildings associated with the aviation industry such as hangers and other equipment are to the west. The project site is not currently visible from the airport facility; a forested buffer of variable width blocks most of the views between the properties.

The project site is visible from most of the stretch of Bethuel Road along its eastern boundary. A treeline and security fencing is present along the west side of Bethuel Road from Kerrville Rosemark Road to the northeastern project boundary, which blocks most of the views of the project site from that section of Bethuel Road. Views towards the west from Bethuel Road show open land interspersed with forested vegetation, and interspersed agricultural buildings (Photo 4). The southern portion of the project site is also visible from Attu Extended.

The closest off-site building is a private residence on Bethuel Road (Photo 9). The house is bounded by Bethuel Road to the east and the project site boundary to the north, west, and south. The western and southern border of the residence contains mature trees and large bushes. From the house on Bethuel Road, a view of the project site is of a large grassy field, with gently undulating textures and a variety of colors depending on the season. Across the road from the project site are croplands, a school, and narrow forested areas.

Photo 9. The closest residence to the site on Bethuel Road, adjacent to the eastern boundary of the project site.

3.5.2 Environmental Consequences

This section describes the potential impacts to visual resources should the Proposed Action or No Action Alternative be implemented. For this analysis, the construction and operation phases are treated separately as construction would be temporary and have different visual impacts from the longer-term operation phase.

3.5.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no project related impacts to visual resources would result. Existing views of the site would be expected to remain relatively unchanged from the present mix of pastureland and forested land. Impacts to visual resources are possible as the city of Millington grows. Additionally, visual changes may occur over time as vegetation on the properties changes. If the land is no longer mowed, vegetation would change from low profile plants to bushes and trees.

3.5.2.2 Proposed Action Alternative

Visual concerns are often associated with both large- and small-scale solar facilities. Construction on the Project would convert open fields, which have been actively used as pastureland, to a commercial/industrial land use type. During the November 2016 site visit, the HDR field team assessed the potential for visual impacts from the Proposed Action on the project site.

Visually speaking, the PV panels would be dramatically different from the current scenery on the site. The viewshed would change from a mostly natural setting with abandoned buildings to a manufactured and structured appearance. Sitewide, after construction of the Project, open landscape of pastureland would be replaced by industrial highly geometric patterns formed by the rows of PV arrays. In the morning and evening, the top of the panels would be upright (approximately 7.6 feet from the ground at full tilt) and visible from the east and west of the project site. The surface of the panels would alter the view, as the dark, almost black surfaces would provide some reflection of the sky and would not conform to the surrounding agricultural, forested, and open views which have softer tones and angles. During mid-day, this effect would not be pronounced because the panels would be relatively flat (approximately 4.5 feet tall when lying flat).

The construction of the proposed solar facility would change the visible environment of the project area. During construction, heavy machinery would be present, though this will not be out of place in comparison to the equipment used at the nearby airfield and for the periodic mowing of the site. Additionally, some tall vegetation would be removed, and part of the site would be graded, changing the contouring, coloring and texture of the scenery attributes. During construction, the project site would appear as a mixture of browns and grays due to earthmoving, road construction, and other construction activities. Water would be used to suppress dust and therefore dust clouds are not anticipated.

The properties with views most affected by the Project are the adjacent house located on Bethuel Road (Photo 9) just south of Kerrville Rosemark Road and approximately four naval base houses on Attu Extended that are surrounded by the project site's southern boundary (Figure 17). These homes are currently surrounded by a narrow buffer of trees that would be removed.

The proposed Project would remove most of the forested buffer between the airfield and the project site. While views would change from treelines to a solar facility, the anticipated manufactured and structured appearance of the solar panels would resemble the industrial appearance of the airfield.

The general public may see the site features briefly while driving on the adjacent public roads. These visual impacts would be most noticed from Bethuel Road, the eastern boundary of the site. The topography of the area is generally flat with areas of gently rolling hills, but the relatively stable elevations and tree-lined drainages/site boundaries block views of the site from most other vantage points. The view of the site by local travelers along Bethuel Road would change with completion of the Project. Though over 2,100 vehicles pass the site each day, the view of PV arrays would not cause negative impacts such as glare. Travelling the speed limit of 45 mph on Bethuel Road would put the view of solar panels at less than one minute when traveling from either direction. Due to the changing visual character of the project area and surrounding area, the change in viewshed from pasture and treelines to a solar facility is not expected to result in adverse impacts.

In April 2015, a glint/glare analysis was carried out by National Renewable Energy Laboratory. The analysis concluded that no glare will be caused by the solar facility that would be visible to

either the air traffic control tower or either runway approach based on the proposed Project design and size. This analysis used the Solar Glare Hazard Analysis Tool with the assumptions that the panels would be industry standard on a single-axis tracking system, and the control tower would have an eye-level height of 42 feet above ground level (National Renewable Energy Laboratory 2015).

Indirect impacts to visual resources around the project site may occur due to increased traffic and movement of heavy machinery throughout the site and along local roads. Overall, there would be minor temporary direct and indirect impacts to visual resources during the construction phase of the Proposed Action. Construction machinery and vegetation removal would change the views from a natural landscape to an active construction site. However, these impacts are considered minor as they would be temporary (less than 1 year) and there are few onlookers in the vicinity that would be affected by the appearance of the activities.

During the operation phase, minor visual impacts would continue to occur. The solar facility site would be revegetated by both planting and natural regrowth and the site would be surrounded by chain-link security fencing topped with barbed wire. Photos 10 and 11 show typical tracking solar panel arrays.

Photo 10. Single-axis, tracking photovoltaic system with panels close to maximum tilt as viewed from the east or west.

Photo 11. The back of the solar panels.

Figure 3 shows the site layout including the solar panels, gravel access roads, and proposed distribution and transmission lines. With the exception of lighting at the on-site substation, the proposed solar facility would have no lighting during operation. The substation lights would normally only be used when inspection and maintenance personnel are present. Construction would generally take place during daylight hours; therefore, no lighting would be needed during construction.

The proposed TVA transmission line and IKC distribution line would consist of approximately 4 miles and approximately 2 miles, respectively, of new overhead lines on new utility poles for the entire routes to the Millington Solar Facility 161-kV substation (Figure 6 and Figure 7). Tree clearing and trimming would be required within the ROWs. The majority of the approximately 1.5-mile segment of the proposed TVA transmission line along Center College Road would be within existing roadside ROW with existing poles and utility lines. The majority of the remaining approximately 3 miles of line would cross agricultural lands in a sparsely populated area along utility easement with existing transmission lines and poles; therefore, the new transmission line would result in no noticeable viewshed changes from the current setting. The majority of the proposed distribution line along Bethuel Road and Navy Road would be within existing ROW or utility easement that contains existing poles and utility lines, thereby resulting in no noticeable viewshed changes.

Once all solar energy facility components are installed and operational, the only other equipment present would be periodic and associated with maintenance and regular mowing of the site. Overall, visual impacts during the operation phase of the Project would be moderate in

the immediate vicinity, but minimal on a larger scale, due to a combination of changes to the visual attributes of the area, the visibility from up to 1 mile away and the existing general local character. These impacts would be minimized, however, due to the sparsely populated immediate area.

3.6 NOISE

This section provides an overview of the existing ambient sound environment in the project area, and the potential impacts to the ambient sound environment that would be associated with the No Action and Proposed Action Alternatives.

3.6.1 Affected Environment

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA and has been adopted by most Federal agencies (USEPA 1974). A DNL of 65 A-weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. The A-weighted sound level, used extensively in this country for the measurement of community and transportation noise, represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974). For point of reference, approximate noise levels (measured in dBA) of common activities/events are provided below.

- 0 – the softest sound a person can hear with normal hearing
- 10 – normal breathing
- 20 – whispering at 5 feet
- 30 – soft whisper
- 50 – rainfall
- 60 – normal conversation
- 110 – shouting in ear
- 120 – thunder

Noises occurring at night generally produce a greater annoyance than do noises of the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are about 10 dBA lower than those during the day (USEPA 1974). Ambient noise at the project area consists

mainly of agricultural, road and air transportation, rural, and natural sounds such as wind and wildlife. Generally, noise levels in these types of areas range from 45 to 55 dBA, although noise levels at the western portions of the Project site would be considerably higher when aircraft are taking off and landing on the nearby runways.

One elementary school and one property associated with the University of Memphis are located within 0.5 mile of the project site. Including a neighborhood to the south, approximately 180 residences are within 0.5 mile of the project site. Of the 180 residences, approximately 160 are located in an unnamed naval housing neighborhood south of Navy Road. Two additional naval base neighborhoods are located directly north and south of the proposed distribution line. Five residences are located immediately adjacent to the project site. The closest sensitive receptor to the project site is an occupied naval base residence on Attu Road, approximately 125 feet from the proposed solar facility (Figure 17). Other sensitive receptors immediately adjacent to the proposed solar facility include several additional naval base houses on Attu Road south of the project site and a residence on Bethuel Road, approximately 160 feet from the proposed solar facility on Bethuel Road. Approximately 15 residences, two small neighborhoods with approximately 10 to 20 houses each, and a recreational vehicle (RV) park are located within 0.5 mile of the proposed transmission line. Land use surrounding the project area is primarily rural residential, golf courses, or undeveloped land with most residences south of the project site, along Navy Road. These residences are primarily located on the opposite side of Navy Road, further separated from the project site by a golf course. An abandoned residential development that was planned by the Navy is north of the project site and could be developed in the future as a residential neighborhood with several houses close to the northern property boundary (Figure 17).

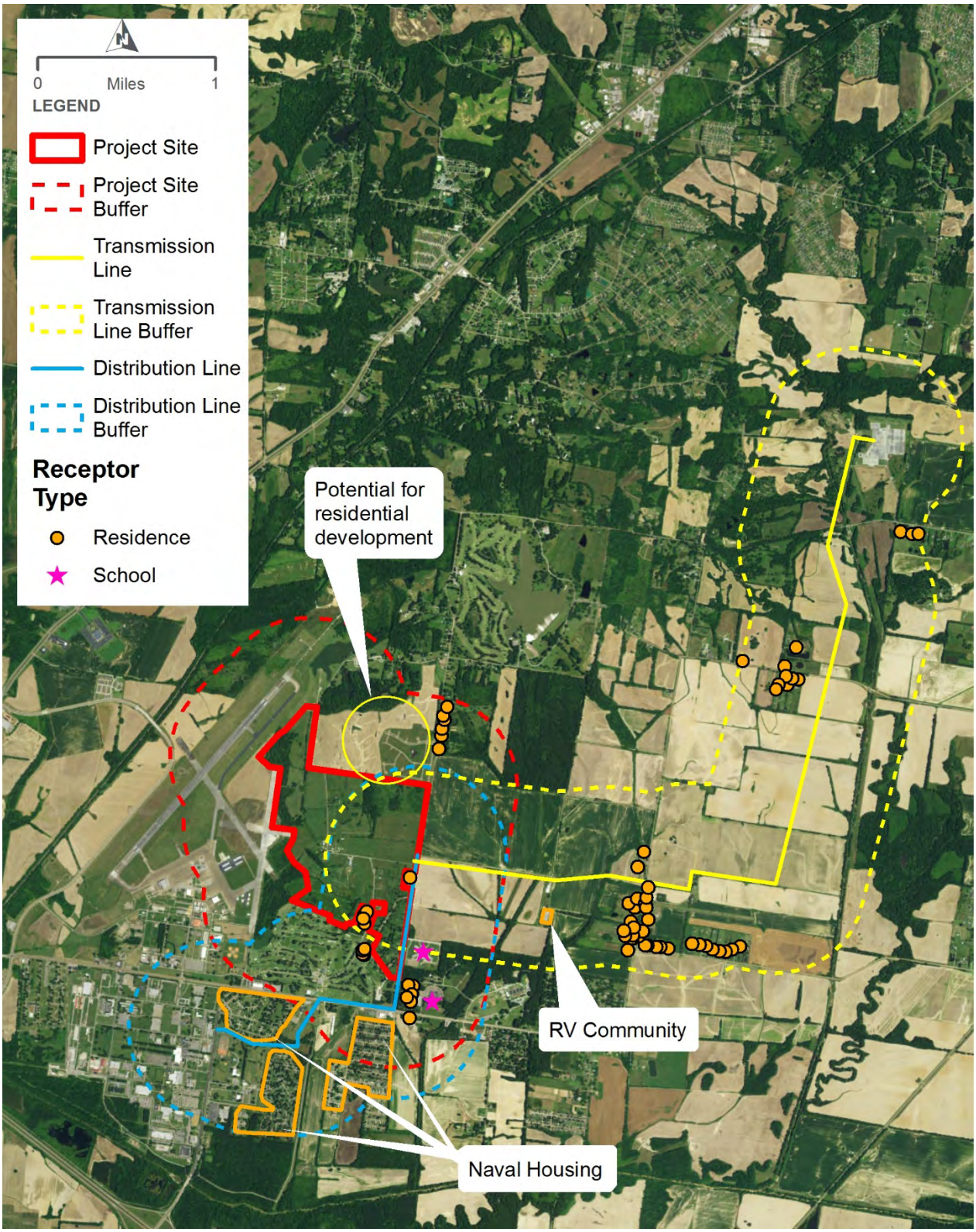

Figure 17. Sensitive noise receptors in the vicinity of the project site.

3.6.2 Environmental Consequences

This section describes the potential impacts to the ambient sound environment should the Proposed Action or No Action Alternative be implemented.

3.6.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed and no project related impacts on the ambient sound environment would occur. Existing land use would be expected to remain a mix of agricultural land and forested land; therefore, the ambient sound environment would be expected to remain as it is at present.

3.6.2.2 Proposed Action Alternative

Direct and indirect noise impacts associated with implementation of the Proposed Action would primarily occur during construction. Construction equipment produces a range of sounds while operational. The noisiest construction equipment, such as delivery trucks, dump trucks, water trucks, service trucks, bulldozers, chain saws, bush hogs, or other large mowers for tree clearing produce maximum noise levels at 50 feet of approximately 84 to 85 dBA. This type of equipment may be used for approximately 6 to 9 months in the project area.

Construction noise would cause temporary and short-term adverse impacts to the ambient sound environment around the project area. The closest sensitive receptor, a residence on the west side of Bethuel Road, is adjacent to the eastern boundary of the project site, approximately 200 feet from the proposed solar arrays. The adjacent residences would temporarily experience heightened noise during construction, primarily from the pile driving activities. Construction would only occur during daylight hours, so the Project would not affect ambient noise levels at night. Work during the early morning hours of the summer months would be inside the construction trailer and would not affect ambient noise levels at dawn. Most of the proposed equipment would not be operating on site for the entire construction period, but would be phased in and out according to the progress of the Project. The equipment most likely to make the most noise would be the pile driving activities during the construction of the array foundations, which would be completed in approximately 4 months. Standard construction pile drivers are estimated to produce between 90 to 95 dBA (calculated at a distance of 50 feet) at close range (USDOT 2011). The specialty pile drivers proposed to be used for solar panel installation produce less noise and the piles supporting solar panels would be driven into soil with little to no rock drilling anticipated. Construction workers would wear appropriate hearing protection in accordance with Occupational Safety and Health Act (OSHA) regulations. The adjacent residences to the proposed electrical lines would temporarily experience heightened noise primarily during the pole driving for the new power poles that would occur during daylight hours.

Existing ambient noise periodically includes airplane engine noise from the adjacent airstrip, tractors, other farm equipment, and highway traffic. Since construction would occur during the day, presumably when airport activities and more traffic would occur, there would not be a significant difference in noise levels other than during pile driving.

Following completion of construction activities, the ambient sound environment would be expected to return to existing levels or below by eliminating more frequent use of mowing equipment. The moving parts of the PV arrays would be electric-powered and produce little noise. Consequently, the Proposed Action would have minimal effects on noise levels as a result of normal continuous operation. The periodic mowing of the site to manage the height of vegetation would produce sound levels comparable to those of agricultural operations in the surrounding area although at less frequent intervals.

Overall, implementation of the Proposed Action would result in minor, temporary adverse impacts to the ambient noise environment for those residents living near the project area during construction, and negligible impacts during operation and maintenance of the solar facility.

3.7 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section describes an overview of existing air quality and greenhouse gas (GHG) emissions in the project area and the potential impacts on air quality and GHG emissions that would be associated with the No Action and Proposed Action Alternative.

3.7.1 Affected Environment

Ambient air quality is determined by the type and amount (concentration) of pollutants emitted into the atmosphere, the size and topography of the air basin in question, and the prevailing meteorological conditions in that air basin. Through its passage of the Clean Air Act of 1970 (CAA) and its amendments, Congress has mandated the protection and enhancement of our nation's air quality. USEPA has established the National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants to protect the public health and welfare: sulfur dioxide (SO_2), ozone (O_3), nitrogen dioxide (NO_2), particulate matter whose particles are less than or equal to 10 micrometers (PM_{10}), particulate matter whose particles are less than or equal to 2.5 micrometers ($PM_{2.5}$), carbon monoxide (CO), and lead (Pb).

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect public welfare (e.g., visibility, crops, forests, soils and materials) from any known or anticipated adverse effects of air pollutants. Areas in compliance with the NAAQS are designated "attainment" areas. Areas in violation of the NAAQS are designated as "nonattainment" areas, and new sources being located in or near these areas may be subject to more stringent air permitting requirements. Nonattainment areas are usually defined by county. National standards, other than annual standards, are not to be exceeded more than once per year (except where noted). Areas that cannot be classified on the basis of available information for a particular pollutant are designated as "unclassifiable" and are treated as attainment areas unless proven otherwise (USEPA 2016).

3.7.1.1 Regional Air Quality

Parts of Shelby County, Tennessee and areas around Memphis are under State Implementation Plan (SIP) for CO (1971) levels and lead (1978) for NAAQS pollutants by the USEPA as of January 2017 (USEPA 2017b). The National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of both Criteria and Hazardous air pollutants from all air

emissions sources. The NEI is prepared every 3 years by the USEPA based on emission estimates and emission model inputs provided by state, local, and tribal air agencies for sources in their jurisdictions, and supplemented by data developed by the USEPA. The average emissions in the county for 2011 are presented in Table 8. These emissions are from the fuel combustion, industrial, fuel combustion other, petroleum and related industries, other industrial processes, waste disposal and recycling, highway vehicles, off highway, solvent utilization, storage and transport, and miscellaneous sectors (USEPA 2014). TVA's coal-fired Allen Fossil Plant in Memphis is one of the major area sources of emissions; its emissions will be greatly reduced when the natural gas-fired combined cycle generating plant currently under construction is completed and the coal-fired units are retired in 2018 (TVA 2014).

Table 8. Average emissions of NAAQS pollutants in Shelby County for 2014.

Pollutant	Emissions (tons per year)
Carbon Monoxide	125,833
Nitrogen Oxides	32,817
PM_{10} Primary	12,710
$PM_{2.5}$ Primary	4,794
Sulfur Dioxide	14,233
Volatile Organic Compounds	38,312
Ammonia	1,716

Source: USEPA 2014

3.7.1.2 Regional Climate

Weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. The climate in the region of the proposed Project is characterized by hot, humid summers with average high temperatures around 82 degrees Fahrenheit (F) and cool winters with average temperatures around 41 degrees F. The annual high temperature is around 73 degrees F and the annual low temperature is around 52 degrees F. Precipitation is highest from November through May. Precipitation averages 54 inches per year (U.S. Climate Data 2015). Approximately 26 tornados occur, on average, throughout the Tennessee each year (National Oceanic and Atmospheric Administration [NOAA] 2015). Millington area historical tornado activity is slightly higher than the Tennessee average and it is 107 percent greater than the overall United States average (City-Data 2017).

3.7.1.3 Greenhouse Gas Emissions

GHGs are compounds found naturally within the earth's atmosphere. These compounds trap and convert sunlight into infrared heat. In this way, GHGs act as insulation in the stratosphere and contribute to the maintenance of global temperatures. As the levels of GHGs increase at ground level, the result is an increase in temperature on earth, commonly known as global warming. The climate change associated with global warming is predicted to produce negative economic and social consequences across the globe through changes in weather (e.g., more intense hurricanes, greater risk of forest fires, flooding).

The most common GHG emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The primary GHG emitted by human activities in the U.S. is CO_2, representing approximately 85 percent of total GHG emissions. The largest source of CO_2 and of overall GHG emissions is fossil fuel combustion. CH_4 emissions, which have declined from 1990 levels, result primarily from enteric fermentation (digestion) associated with domestic livestock, decomposition of wastes in landfills, and natural gas systems. Agricultural soil management and mobile source fuel combustion are the major sources of N_2O emissions in the United States (USEPA 2014). Shelby County GHG emissions from 2015 are shown in Table 9. GHG emissions from the TVA power system are described in TVA's 2015 IRP (2015a).

Table 9. Average emissions of GHGs in Shelby County for 2015.

Pollutant	Emissions (tons per year)
Carbon Dioxide	5,026,887
Methane	201,260
Nitrous Oxide	21,380

Source: USEPA 2015

3.7.2 Environmental Consequences

This section describes the potential impacts to climate and air quality should the Proposed Action or No Action Alternative be implemented.

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no project related impacts on climate or air quality would result. Existing land use would be expected to remain a mix of pastureland and forested land, and the existing habitat would be expected to remain as it is at present, with little effect on climate and air quality. The main source of emissions in the project area would continue to be from mobile sources such as automobiles, agricultural equipment, and equipment associated with the adjacent airfield. .

3.7.2.2 Proposed Action Alternative

The majority of potential air quality impacts associated with the Proposed Action would occur during construction. Construction activities would create emissions from the construction equipment and vehicles, contracted employee's personal vehicles, and fugitive dust mobilization from clearing, grading and other activities. Open burning of tree debris from the minimal tree clearing on the project site would not be permitted due to the project site's proximity to the Millington Regional Jetport and Navy land. Tree debris from clearing would be removed by chipping and grinding. No burning of other construction debris would be permitted. Approximately 95 percent (by weight) of fugitive emissions from vehicular traffic over paved and unpaved roads would be comprised mainly of particles that would be deposited near the roadways along the routes the construction and contractors' vehicles would travel to reach the site. As necessary, fugitive dust emissions from construction areas, paved, and unpaved roads

would be mitigated using BMPs including wet suppression. Wet suppression can reduce fugitive dust emissions from roadways and unpaved areas by as much as 95 percent. Therefore, direct impacts to air quality associated with construction activities would be expected to be minor.

No noticeable direct or indirect impacts to regional climate would be associated with the construction of the proposed Project. The use of construction equipment would cause a minor temporary increase in GHG emissions during the construction activities. Combustion of gasoline and diesel fuels by internal combustion engines (haul trucks and off-road vehicles) would generate local emissions of PM, nitrogen oxides (No_x), CO, volatile organic compounds (VOCs), and SO_2. The total amount of these emissions would be small and would result in negligible impacts.

Tree removal during construction on the project site would represent a minor loss of potential carbon sequestration potential. The trees currently remove CO_2 from the air and sequester it as biomass. The loss of this carbon sink would constitute a minor adverse direct and indirect impact as sequestration would have continued for the life of the trees and long into the future.

The operation of the proposed solar facility and associated electrical lines is not anticipated to have any negative impacts to air quality or GHG emissions. No emissions would be produced by the operation of the solar facility or electrical lines. Minor emissions would occur during maintenance activities, including facility inspections and periodic mowing.

Conversely, overall emissions of air pollutants from the TVA power system would decrease during operations as the emissions-free power generated by the solar facility would offset power that would otherwise be generated, at least in part, by the combustion of fossil fuels. The reduction in GHG emissions resulting from the operation of the solar facility would have little noticeable effect at regional or larger scales. It would, however, be a component of the larger planned system-wide reduction in GHG emissions by the TVA power system. The adverse impacts of GHG emissions and the beneficial impacts of TVA's reduction in GHG emissions are described in more detail in TVA (2015a).

3.8 CULTURAL RESOURCES

This section describes an overview of existing cultural resources within the project area vicinity and the potential impacts on these cultural resources that would be associated with the No Action and Proposed Action Alternatives. Components of cultural resources that are analyzed include archaeological and architectural resources.

3.8.1 Affected Environment

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

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

- *Criterion A:* association with events that have made a significant contribution to the broad patterns of our history. Such events may include a specific occurrence or pattern of occurrences, cultural traditions, or historic trends important at a local, regional, or national level. To be considered in association with a cultural resource, events must be important within the particular context being assessed.

- *Criterion B:* association with the lives of persons significant in our past. People considered may be important locally, regionally, or nationally, and the cultural resources considered are limited to properties illustrating a person's achievements rather than commemorating them.

- *Criterion C*: embodiment of the distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possessing high artistic values; or representative of a significant and distinguishable entity whose components may lack individual distinction. Cultural resources considered generally include architectural resources such as buildings, objects, districts, and designed landscapes.

- *Criterion D*: cultural resources that have yielded, or may be likely to yield, information important in prehistory or history. Considered cultural resources typically include archaeological sites but may also include buildings, structures, and objects if they are the principal source of important information not contained elsewhere.

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

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

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

A project may have effects on a historic property that are not adverse. However, if the agency determines (in consultation) that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting 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. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects, or planting visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with state historic preservation officers (SHPOs), federally-recognized Indian tribes, and others throughout the Section 106 process and to document adverse effects to historic properties resulting from agency undertakings. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA review to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered by federal agencies. Generally these considerations are accomplished through consultation with parties having a vested interest in the undertaking, as described above. The Tennessee Historical Commission specifically addresses NHPA and NEPA coordination and suggests agencies initiate Section 106 review early in the planning process.

The undertaking's APE for direct effects has two main components: 1) the footprint of the proposed PV array and 2) the ca. 4.9-mile long, 100-foot wide proposed ROW for the 161-kilovolt (kV) electrical transmission line that would connect the PV array's transformers to TVA's existing Shelby 500-kV Substation in Millington, along with associated off-ROW access roads and off-ROW guy wire anchors. TVA determined the APE for indirect effects to be areas within a 0.5-mile radius surrounding both components of the undertaking that would have unobstructed lines of sight to the PV array and transmission line (TL).

3.8.1.1 Cultural Setting

Human occupation in middle 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 United States.,

this initial period was followed by 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 floodplains and alluvial terraces along rivers and tributaries. Specialized campsites and resource extraction sites tend to be located on older alluvial terraces and in the uplands.

When compared with surrounding regions to the west, the loess hills of western Tennessee appear to have a greater density of diagnostic Paleoindian artifacts as well as plentiful good quality chert. Early Paleoindian people are believed to have had small, mobile social units with seasonal migrations relating to the movement of the extinct large fauna they exploited, evidence of which exists in western Tennessee (Breitburg and Broster 1995; Brister et al. 1981; Williams 1954). Following dramatic climatic changes and the extinction of 35 genera of large animals at the end of the Pleistocene (Ice Age) era, evidence shows marked changes in subsistence and settlement patterns. Subsistence during the Archaic Period shows increased emphasis on gathering plants (particularly nuts and seeds), the exploitation of shellfish, a gradual increase in population, and a shrinking of foraging ranges with a greater focus on specific ecoregions. Archaic peoples continued hunting large game such as bison and deer, utilizing spears and darts thrown by atlatls (spear-throwers). Western Tennessee's data on the Archaic Period are sparse in comparison to surrounding areas, but a few sites have been identified that help characterize Archaic adaptions as focused on intensive exploitation of diverse ecological zones and the eventual demarcation of territorial boundaries (Anderson et al. 1987; Childress et al. 1993; Childress and Wharey 1996; Jennings 1989; Lewis and Lewis 1961; Mainfort 1985; Smith 1979 and 1991).

Several Woodland sites have been recorded in the project area vicinity. This period witnessed the first use of small oily and starchy-seeded plants, followed eventually by horticulture focused on maize, beans, and squash by the end of the Woodland Period. The bow and arrow, introduced ca. 1,350 to 1,150 BP (Blitz 1988), replaced the spear and atlatl, perhaps as a result of intergroup warfare. The Mississippian Period is marked by the shift to stronger, shell-tempered ceramic vessels. Settlements consisted of large towns in the floodplains of major river valleys, where inhabitants practiced agriculture focused on maize, beans, and squash. Human-made mounds indicating ceremonial significance and an elite hierarchy were common in large towns. Mound placement was based on basic geometric principles often in alignment with equinox and solstice points and other important markers.

The first European exploration of the Mid-South occurred when Hernando De Soto led a Spanish entrada through the region in 1542. Large uninhabited areas were noted between the towns of Late Mississippian peoples, supporting notions that Mississippian chiefdoms were separated by buffer zones. After contact, Mississippian populations are believed to have decreased by as much as 90 percent, probably due to the introduction of European diseases. During the early historical period, portions of Tennessee were included in French, Spanish, and, eventually, American land claims (Bauch 1972; Ornelas-Struve and Coulter 1982; Twyman 1850). Nonetheless, the region continued to be occupied by Native Americans descended from Mississippian peoples, including the Chickasaw, Choctaw, and Shawnee. These people lived in small villages, hunted wild game, practiced small-scale farming, and traded with whites.

American independence led to a rapid population expansion westward. Early Euro-american settlers of western Tennessee came mostly from middle and eastern Tennessee, as well as parts of North Carolina, South Carolina, and Virginia. These pioneers settled on land granted by the State of North Carolina (Sease et al. 1989). Tennessee separated from North Carolina and became a state in 1796. In 1818, the federal government, represented by Andrew Jackson and Isaac Shelby as negotiators, purchased all lands east of the Mississippi River and north of the Mississippi state line from the Chickasaw Indians in the Treaty of Tuscaloosa, also called the Jackson Purchase (Van West 1998). In exchange for ceding their lands, the Chickasaw were to be compensated $300,000, though many Chickasaw dispute that this money was ever paid. As early as 1819, a group of investors, including Andrew Jackson, laid out the town of Memphis (Williams 1897:27). Shelby County was created in 1820, and in that same year, a land office was established for western Tennessee in McLemoresville (Maddox 1961).

Colonel Clement McDaniel is believed to have been the first white settler in northern Shelby County. McDaniel had already established a homestead when surveyor John Ralston came to the area to plot land claims for Revolutionary War veterans, sometime before 1820 (Hall 2012:1). Around this time, settlers also began to form communities around Big Creek, a tributary to the Loosehatchie River. These communities included Kerr, Shakerage, and Millwood (Hall 2012). These early settlers cleared large areas of forest to grow cotton, resulting in erosion and frequent, damaging flooding from Big Creek.

Given the intensity of cotton agriculture in Shelby County, large numbers of people were required for labor and enslaved African Americans were exploited for this purpose. As early as 1820, nearly a third of the population were slaves. The slave population peaked in the 1840 and 1850 census, when enslaved people comprised almost 48 percent and 46 percent of the population of Shelby County, respectively. From 1830 on, Shelby County was also home to free African Americans. The largest percentage of free black citizens were counted in 1830, comprising 1.1 percent of the total county population. Cotton remained a staple crop of Shelby County farmers throughout the antebellum period. In 1860, 398,000 bales of cotton were produced in the county, valued at $18 million (Williams 1897:31). However, as one historical commentator noted, at this time “the pursuit of agriculture was virtually in the hands of black slaves [with] the planters themselves living in princely extravagance” (Williams 1897:31). This way of life was soon overturned by the Civil War.

On June 8, 1861, an election was held in Tennessee to decide the question of secession from the Union. The result was a more than two-to-one vote for separation (Henry 1991). In August of 1861, Tennessee ratified the Confederate Constitution and joined her sister states in the four-year struggle against the Union. In August of 1861, Tennessee ratified the Confederate Constitution and joined the rebellion. Rebel sentiment was strong in Shelby County. In the June 8, 1861 referendum, 7,000 county residents voted for secession while only five voted to remain in the Union (Harkins 2008:65). While these numbers may have been skewed by the out-migration of Unionists prior to the vote, the secession fervor of white residents was clear.

Memphis was quickly established as a military depot and ordnance center, and the city’s manufacturing focused on supplying the war effort (Harkins 2008). Shelby County raised 53

Confederate companies, comprising an estimated 6,000 men, nearly the same number of registered voters in the county (Harkins 2008:66). In February 1862, Union General Ulysses S. Grant secured control of the Tennessee and Cumberland Rivers from the Confederacy, which delivered western Tennessee into Union control (McKenzie 2001:202). In June of that year, the Confederacy lost a naval battle on the Mississippi River at Memphis, further securing Union control of western Tennessee.

Nathan Bedford Forrest's military resistance in the area continued throughout the war. In the winter of 1862, Forrest's Brigade launched many successful cavalry raids against Federal troops, capturing munitions, several garrisons (including the 119th and 122nd Illinois Infantry), destroying miles of railroad track and trestles, and disrupting Union military activity (Henry 1991). No action is known to have occurred in the Millington vicinity during the Civil War. After the Confederates' defeat at Nashville in January 1863, Lincoln appointed Andrew Johnson (a native of Greeneville, TN) military governor and abolished slavery in the state. Tennessee was the first state readmitted to the Union after the war.

Following the Civil War, the economic and political recovery of western Tennessee was slow. By the late nineteenth century, Shelby County focused once again on agricultural production, mainly cotton, and the ever-pressing problem of transportation. In the 1870s, the Chesapeake and Ohio Railroad planned to connect from Memphis to destinations north. George Millington, a north Shelby County farmer, subdivided a portion of his landholdings for the construction of a depot and town, thereby creating what would become the City of Millington. However, the town grew slowly and was not incorporated until 1903 (Hall 2012).

By 1914, Millington boasted a number of businesses, schools, and churches, along with a telegraph office and a newspaper (Hall 2012). During World War I, the U.S. Army Air Force leased and later purchased farmland east of Millington to construct Park Field, an early pilot training facility. After World War I, Park Field lay dormant until the Depression, when it was used for a transient camp for unemployed men under President Roosevelt's Resettlement Administration (Hall 2012). Hundreds of workers lived at Park Field during the 1930s, employed by the Works Progress Administration to develop the Shelby Forest Recreational Demonstration Area, later renamed the Meeman-Shelby Forest State Park.

By 1942 the nation was again at war, and the government expanded Park Field for use as a Naval Reserve Aviation Base to train aviation cadets. The name was changed in 1943 to Naval Air Station (NAS) Memphis. Also during World War II, the government purchased more than 5,000 acres of land west of Millington for a munitions plant that employed more than 14,000 men and women during the war (HHM 2004). Infrastructure, utilities, and businesses throughout the region were upgraded to accommodate the population explosion.

After the war, the munitions plant was closed and disassembled, but NAS Memphis continued to grow, eventually becoming the world's largest inland naval base. During World War II, 17,000 officers and enlisted men were trained at NAS Memphis, and even more were trained here during the Korean Conflict, from 1950 to 1953 (HHM 2004). The facility continued to expand throughout the 1950s, 1960s, and 1970s, primarily to the south and west of the current project's APE. The population of Millington more than quadrupled in 20 years, expanding from 4,696 in

1950 to 21,177 in 1970. By the early 1990s, approximately 19,000 Navy and U.S. Marine Corps students graduated from the training programs at NAS Memphis every year (HHM 2004).

In 1994, NAS Memphis was transitioned from training activities to administrative functions. As part of this reassignment, approximately 1,900 acres of the NAS Memphis were determined to be surplus and was disposed of through a reuse plan developed with the City of Millington (Department of Defense 1999). The Naval Air Technical Training Center was established in Pensacola, Florida, and soon thereafter, Millington's population declined to 10,433 people, according to the 2000 census (U.S. Census). The Navy renamed the Millington facility the NSA Mid-South, and assigned it to the Bureau of Naval Personnel, the Navy Recruiting Command, and the Navy Manpower Analysis Center (HHM 2004). While the city of Millington is still dominated by the NSA Mid-South, it is also developing into a suburb of Memphis.

3.8.1.2 Previous and Current Cultural Resource Surveys within the APE

Solar Facility

As discussed in Section 3.1.1, the proposed PV array site was formerly part of the NSA Mid-South facility and was previously known as the U.S. NAS Memphis, which was closed in 1999 during implementation of the BRAC. The Tennessee SHPO concurred with the Navy's assessment that no archaeological investigations were required for that proposed project due to the extensive disturbance of soils and previous development (Department of Defense 1999). Based on this previous SHPO concurrence, an archaeological survey for the proposed solar facility project was not conducted. The majority of the visual APE for the PV array has been surveyed under the BRAC EA. One building on the NSA Mid-South property—Building N-1—was determined eligible for listing on the NRHP (Department of Defense 1999). This building was proposed for demolition under the MBRC reuse plan. It was subsequently demolished and the adverse effects of its demolition were mitigated under the terms of a Programmatic Agreement between the Navy, Tennessee SHPO, and the Advisory Council on Historic Preservation. In 2015, the Navy consulted with SHPO on the effects of its proposed lease of the 72 acres of the NSA Mid-South property for the proposed solar facility that was not covered by the BRAC EA (labeled "CATEX Area" in Figure 18. Six circa 1940s military housing buildings (Buildings 551, 554, 553, 550, 591, 592) recorded during the Department of Defense's (DOD) Integrated Cultural Resources Management Plan (ICRMP) were identified within the viewshed (Department of the Navy 2005). All seven buildings were previously determined eligible for the NRHP. The DOD, in consultation, determined that the 72-acre portion of the solar facility would have no effects on these seven properties due to existing vegetative screening and a golf course that would serve as visual buffers to the project area. SHPO concurred that the proposed lease would not adversely affect any properties listed on the NRHP (McIntyre 2015). Both the vegetative screening and golf course will remain unchanged. As such, TVA finds that the proposed undertaking would have no effect to Buildings 551, 554, 553, 550, 591, and 592.

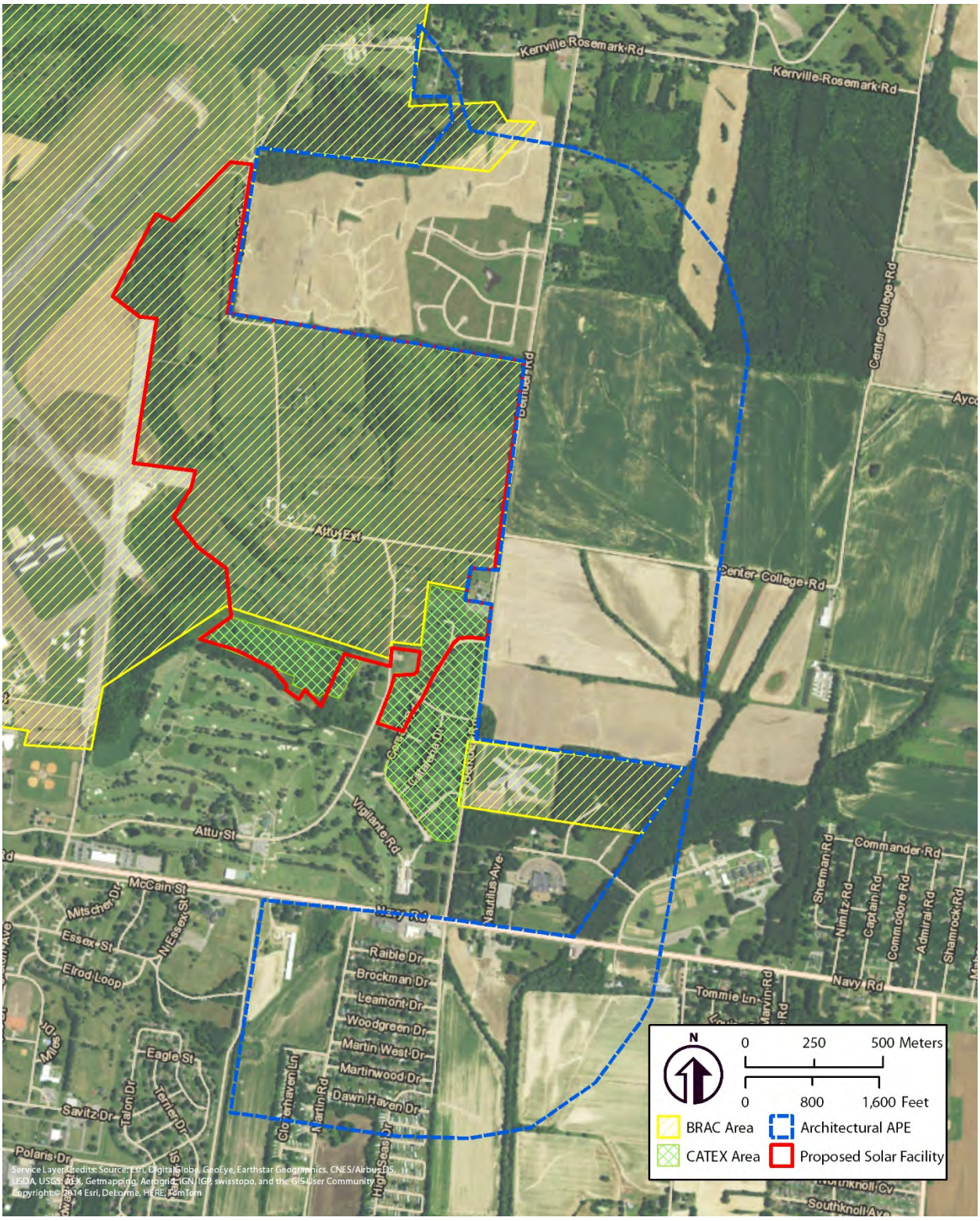

Figure 18. APE for the solar facility site.

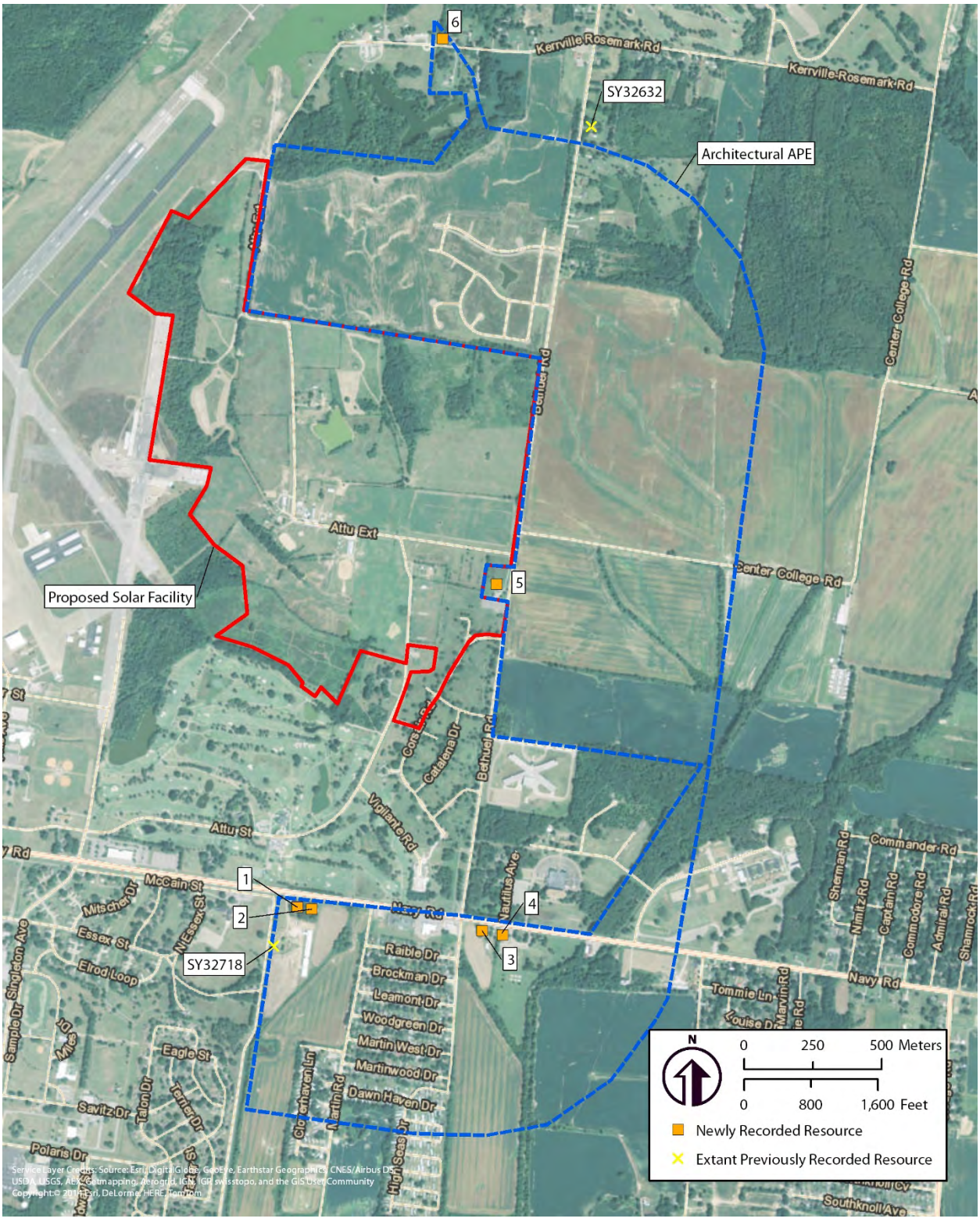

Figure 19. Location of newly recorded resources and extant previously recorded resources within the APE for the solar facility

As part of the evaluation process, an architectural survey of the solar facility was conducted in March 2017 for the remaining portion of the APE not covered by the BRAC EA and "CATEX Area" (Figure 18). The APE is on the east side of the former portion of NSA Mid-South, much of which is now the Millington Regional Jetport, operated by the City of Millington. The viewshed area is both within and outside of the incorporated city limits of Millington. The cultural resources assessment for the APE consisted of background research, architectural survey, initial NRHP evaluations, and results summary (Futch, et al. 2017). Two previously recorded (SY32718 and SY32632) and six newly recorded (1-6) architectural resources were identified within the solar facility portion of the APE (Figure 19). Identified resources include mostly mid-twentieth century plain/traditional and ranch houses. Archival research did not identify historical associations that would qualify any of these resources under Criteria A or B. Many had extensive alterations that compromised their historic integrity, including material and design alterations such as large-scale additions, the replacement of original doors and windows, and the addition of synthetic siding. Because of the moderate to low level of integrity, these resources do not qualify for inclusion under Criterion C, and there is no known potential for these resources to qualify under Criterion D. In addition, there is no potential for a historic district, as the resources range widely in their construction date, type, style, and planning. As such, none of these resources are recommended eligible for inclusion in the NRHP, either individually or as a district. TVA determined that SY32718, SY32632, and Resources 1-6 are ineligible based on lack of integrity, association with a significant event(s) or person(s) and/or architectural distinction. TVA consulted with the Tennessee SHPO regarding a no adverse effect finding based on this recent and previous surveys. In a letter dated October 12, 2017, the Tennessee SHPO concurred with TVA's no adverse effect finding.

Table 10. Architectural resources recorded during survey of solar facility APE.

Resource number	Address	Date built	Type or style	NRHP recommendation
SY32718	6189 Navy Road	1945-1966	Plain/traditional house	Not eligible
SY32632	8710 Bethuel Road	1930	Plain/traditional house	Not eligible
1	6199 Navy Road	1954	Ranch house	Not eligible
2	6215 Navy Road	1963	Ranch house	Not eligible
3	6419 Navy Road	1950	Plain/traditional house	Not eligible
4	6437 Navy Road	1950	Plain/traditional house	Not eligible
5	8161 Bethuel Road	1960	Plain/traditional house	Not eligible
6	6344 Kerrville Rosemark Road	1968	Plain/traditional house	Not eligible

Distribution and Transmission Line

The proposed distribution line is entirely within an existing, previously disturbed utility easement and ROW and was surveyed as part of the DOD's ICRMP (Department of the Navy 2005). No new ROW or easement is required for the proposed distribution line.

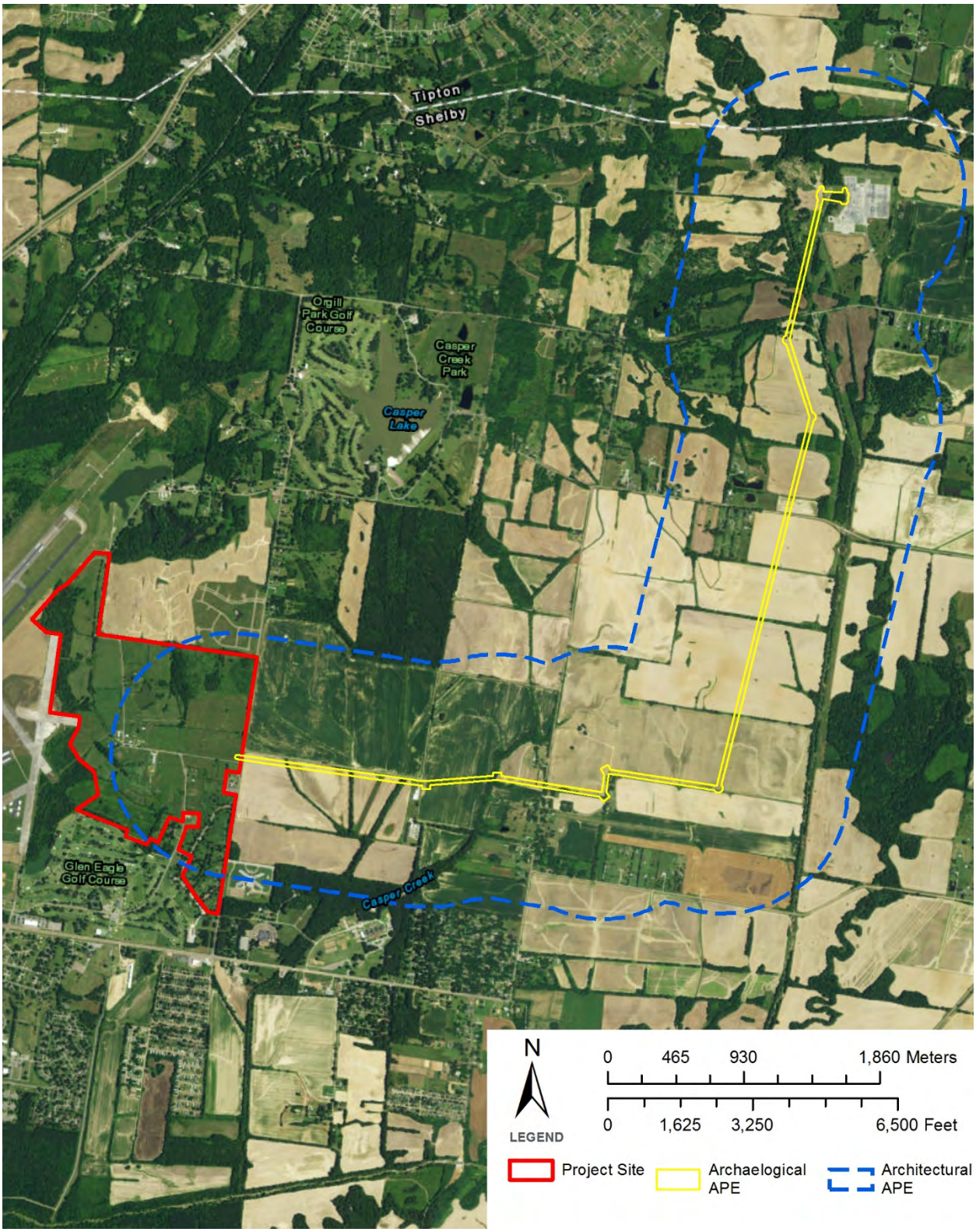

Figure 20. APE for the transmission line corridor

In July, August, and September 2017, Tennessee Valley Archaeological Research (TVAR) conducted a phase I cultural resources (archaeological and architectural) survey for the APE associated with the newly acquired ROW for the proposed transmission line (Figure 20).

TVAR's archaeological survey identified seven newly recorded archaeological sites (40SY769–40SY775), one non-site locale () and two isolated finds. All of the sites represent portions of larger sites that extend outside of the ROW. The portions of the sites within the APE lack research potential and thus no further investigation of these sites is recommended in connection with the undertaking as currently proposed. Based on this survey TVA finds that the transmission line ROW and guy wire anchor locations contain no NRHP-listed or –eligible archaeological sites. In a letter dated December 7, 2017, the SHPO concurred with this finding.

TVA also conducted an archaeological survey of areas that would be affected by the use of off-ROW access roads (for transmission line construction). Based on a management summary describing the survey, one ineligible archaeological site was identified in this survey. TVA finds that no archaeological resources listed or considered eligible for listing in the NRHP are located in the off-ROW portion of the APE. TVA will consult with the SHPO to fulfill its obligations under Section 106 of the NHPA. If following consultation, the SHPO has questions or disagrees with TVA's findings and recommendations, supplemental NEPA analysis and further consultation with the TN SHPO will be completed.

The architectural survey of the proposed transmission line identified 21 previously recorded architectural resources (SY-32402/Paw Paw Block Farm [which includes eleven contributing outbuildings recorded as SY-32298, 32307, 32308 and 32313-32318, SY-32400 and 32403]; SY-32112, 32627-32631, and 32721-32723) within the APE and six newly recorded resources (IS-1 through IS-6) within the APE. Four of the previously recorded resources (SY-32627, 32628, 32631 and 32721) are extant but located outside the viewshed of the project area. Resources SY-32315, -32403 and -32723 are no longer extant. Resources SY-32112, -32298, -32307, -32308, -32400, -32629, -32630 and -32722 are not eligible for the NRHP due to modern alterations and lack of architectural distinction. The Tennessee SHPO determined The Paw Paw Block Farm (SY-32402) eligible for the NRHP in 2003. Based on the current study, TVA has determined that the house that anchors the farm (SY-32402) and associated outbuildings SY-32313, -32314, -32316, -32317 and -32318 continue to be eligible for the NRHP under Criterion A for their significance in the area of agriculture. Newly recorded architectural resources, IS-1 through IS-6, are recommended ineligible for the NRHP due to their lack of architectural distinction and loss of integrity caused by modern alterations (Table 11).

Table 11. Architectural resources in the transmission line portion of the APE.

Resource number	When recorded	NRHP eligibility/status
SY-32402	Previously (Paw Paw Block Farm)	Eligible
SY-32313	Previously (contributing element)	Eligible
SY-32314	Previously (contributing element)	Eligible
SY-32316	Previously (contributing element)	Eligible

Resource number	When recorded	NRHP eligibility/status
SY-32317	Previously (contributing element)	Eligible
SY-32318	Previously (contributing element)	Eligible
SY-32315	Previously (contributing element)	Non-extant
SY-32403	Previously (contributing element)	Non-extant
SY-32723	Previously	Non-extant
SY-32298	Previously (contributing element)	Not eligible
SY-32307	Previously (contributing element)	Not eligible
SY-32308	Previously (contributing element)	Not eligible
SY-32400	Previously (contributing element)	Not eligible
SY-32112	Previously	Not eligible
SY-32629	Previously	Not eligible
SY-32630	Previously	Not eligible
SY-32722	Previously	Not eligible
IS-1	Current survey	Not eligible
IS-2	Current survey	Not eligible
IS-3	Current survey	Not eligible
IS-4	Current survey	Not eligible
IS-5	Current survey	Not eligible
IS-6	Current survey	Not eligible
SY-32627	Previously	Outside viewshed
SY-32628	Previously	Outside viewshed
SY-32631	Previously	Outside viewshed
SY-32721	Previously	Outside viewshed

3.8.2 Environmental Consequences

This section describes the potential impacts to cultural resources should the Proposed Action or No Action Alternative be implemented.

3.8.2.1 No Action Alternative

Under the No Action Alternative, no project related impacts to cultural resources would occur. The landscape in the project area would remain relatively unchanged from the present mix of pastureland and forested land.

3.8.2.2 Proposed Action Alternative

No archaeological sites listed or eligible for listing in the NRHP were identified within the solar facility portion of the APE. Results of the previous and current architectural surveys conducted within the architectural APE for the solar array identified six NRHP-eligible circa 1940s military houses. TVA determined that the current vegetative screening and golf course would serve as screening and would have no visual effect on these historic properties. The remaining eight historic structures identified with the solar APE were determined ineligible for the NRHP. In a letter dated October 12, 2017, the Tennessee SHPO concurred with TVA's no effect finding for the solar facility portion of the APE.

The archaeological survey of the ROW and off-ROW guy wire anchor portions of the transmission line corridor identified a total of eight newly recorded sites. In its consultation with

the Tennessee SHPO and federally-recognized Indian tribes, TVA recommended no further investigation of these sites in connection with the undertaking due to the lack of research potential, finding that activities taking place within the transmission line ROW (including the installation of guy-wire anchors just outside the ROW) would not affect any archaeological sites listed in, or eligible for listing in, the NRHP. In a letter dated December 7, 2017, the TN SHPO concurred with this finding.

TVA has also evaluated the potential effects of the use of off-ROW access roads necessary for transmission line construction. Based on management summaries describing the surveys, no archaeological resources listed on or eligible for listing on the NRHP are located in the off-ROW portion of the APE. TVA will consult with the SHPO to fulfill its obligations under Section 106 of the NHPA. If following consultation, the SHPO has questions or disagrees with TVA's findings and recommendations, supplemental NEPA analysis and further consultation with the TN SHPO will be completed.

The architectural survey of the transmission line identified 21 previously recorded resources including SY-32723/Paw Paw Block Farm and five associated buildings (SY-32313, 32314, 32316, 32317 and 32318) that continue to be eligible for the NRHP and are in the APE. TVA finds that the proposed undertaking would result in an effect on Paw Paw Block Farm, but that the effect would not be adverse. In a letter dated December 7, 2017, the SHPO concurred that the proposed undertaking would have no adverse effect on the Paw Paw Block Farm.

3.9 UTILITIES

This section describes an overview of existing utilities within the project area and the potential impacts on these utilities that would be associated with the No Action and Proposed Action Alternatives. Specific utility components analyzed below include electrical service, natural gas, and water supply.

3.9.1 Affected Environment

The City of Millington is located in Shelby County with local water and sewer treatment facilities, and solid waste disposal services. No occupied residences are located on site; therefore, it is assumed there are currently no communication resources on the project site.

3.9.1.1 Electrical Service

Electrical service is provided in the project area by Memphis Light Gas & Water through TVA. Existing power lines are present on the project site along portions of Bethuel Road, Attu Extended, and Kerrville Rosemark Road.

3.9.1.2 Natural Gas

Natural gas in the area is provided by Memphis Light Gas & Water. No natural gas lines were observed on the project site, though the residences which immediately border the eastern and southern sections of the project site likely have gas service.

3.9.1.3 Water Supply

Water service in the area is provided by Memphis Light Gas & Water. Several existing water lines cross the project site: one bisects the site generally east to west within an existing utility easement along Kerrville Rosemark Road. The other water lines cross the project site north to south within a utility easement along Attu Extended and Kerrville Rosemark Road. The existing water lines cross several wetlands and Stream 5 on the project site (Figure 3 and Figure 16).

Sewer service in the project area is provided by City of Millington Sewer. Existing sewer lines bisect the project site generally east to west within the existing utility easement along Kerrville Rosemark Road and generally north to south within existing easement that parallels to the west side of Stream 5 and Wetland 8. The existing sewer lines cross several wetlands on the project site (Figure 3 and Figure 16).

3.9.2 Environmental Consequences

This section describes the potential impacts to utilities should the Proposed Action or No Action Alternative be implemented.

3.9.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, there would be no project related impacts to utilities. Existing land use would be expected to remain a mix of pasture, small areas of forested land, and partially developed land, and existing on-site utilities would likely remain unchanged, with the exception of potential upgrades and maintenance.

3.9.2.2 Proposed Action Alternative

Under the Proposed Action, approximately 5 miles of new transmission line and 2 miles of new distribution line would be installed from the solar facility to the Shelby 500-kV Substation and East Switching Station, northeast and southwest of the project area, respectively, as discussed in Section 2.2.3. No upgrades or changes would be made to existing electrical lines and therefore, there would be no interruption of service. Electrical service would be provided by Memphis Light Gas & Electric to the Millington Solar Facility. Memphis Light Gas & Electric would coordinate with the customers if outages are necessary. Therefore, no adverse impacts would be anticipated to electrical services with implementation of the Proposed Action. No other utility services would be required to construct and operate the Project and there would be no impacts to other utilities. Implementation of the Proposed Action would result in additional renewable energy resources in the region which would constitute a beneficial impact to electrical services in the region. The Proposed Action would also provide a backup energy supply to the NSA Mid-South facility for naval energy security, which would constitute a beneficial impact to electrical services.

3.10 WASTE MANAGEMENT

This section describes an overview of existing waste management within the project area and the potential impacts to waste management that would be associated with the No Action and Proposed Action Alternatives. Components of waste management that are analyzed include solid and hazardous waste and materials.

3.10.1 Affected Environment

“Hazardous materials” and “hazardous waste” are substances, which because of their quantity, concentration, or characteristics (physical, chemical, or infectious), may present a significant danger to public health and/or the environment if released. These substances are defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. §§ 9601 et seq.) and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act ([RCRA]; 42 U.S.C. §§ 6901 et seq.). Regulated hazardous wastes under RCRA include any solid, liquid, contained gaseous, or semisolid waste or combination of wastes that exhibits one of more of the hazardous characteristics of ignitability,

corrosivity, toxicity, or reactivity, or is listed as a hazardous waste under 40 CFR part 261. Storage and use of hazardous materials and wastes are regulated by local, state, and federal guidance including the Emergency Planning and Community Right-to-Know Act (42 U.S.C. §§ 116 et seq.) and RCRA.

In March 2017, as part of the property purchase process, HDR conducted a Phase I Environmental Site Assessment (ESA), dated April 5, 2017, on the project area to establish the presence, former use or spillage of hazardous substances or petroleum products (HDR 2017). A Phase I ESA was previously prepared by BWSC, dated May 26, 2015.

The Phase I ESA identifies Recognized Environmental Conditions (RECs) that may adversely affect the project area. The Phase I ESA included a summary of site reconnaissance conducted on March 8, 2017, a review of environmental databases, and a review of historical data sources. The Environmental Data Resources (EDR) database report did not identify any listings within the project site. However, the EDR Report did find 10 database listings within the search radius (ASTM-defined search distances). It should be noted that multiple database listings were found for the same location or address, and ultimately four unique properties were documented in the EDR database report.

HDR reviewed the listings identified within the database search area. None of the listings or sites that were identified in the EDR Report are considered potential concern to the Project based on factors such as distance, hydraulic gradient, geology, or clean-up status (distances are approximate).

- **Memphis Naval Base/Support Facility** is listed at 5722 Integrity Drive, and portions of this overall property make up the southern and southeastern lease portions of the project site. These listings associated with Memphis Naval Base/Support Facility are located approximately 0.5 mile or greater in distance, predominantly to the west and southwest of the project site. The facility is listed in multiple databases. Although, the NSA, airfield and associated structures have contributed to multiple listings in federal and state databases none of the areas of concern were associated directly with the project site. Further, references to the Finding of Suitability to Transfer (FOST) documents are included in the Activity and Use Limitations (AULs) in Appendix G of the Phase I report. The NSA areas of concern that were documented in the FOST are outside of the project site and would not be involved in site development or leasing associated with the proposed Project.
- **Mapco Express** is listed at 6379 Navy Road, and is located approximately 0.2 mile south-southeast (downgradient) of the project site. The facility is listed in multiple databases. Three active 12,000-gallon gasoline underground storage tanks (USTs) are registered to this gas station. Releases associated with piping leaks and pressure test failures have been reported.
- **Shelby County Fire Department (Station #4)** is listed at 6457 Navy Road and is located approximately 0.25 mile south-southeast (downgradient) of the project

site. The facility is listed in multiple databases. Two closed 500-gallon gasoline and diesel USTs were registered at the fire station. Pressure test failures had been reported.

- **Texaco (Navy Road)** is listed at 6293 Navy Road, approximately 0.25 mile south-southeast (downgradient) of the project site. The facility is listed in multiple databases. Two former 5,000-gallon gasoline USTs and one former 4,000-gallon gasoline UST was registered at the gas station. A petroleum release was discovered as the result of removal of the three tanks in the mid-1990s. No further detail was provided regarding the leaking underground storage tank (LUST) listing, other than monitoring networks were in place as of 1996. No further listings of active LUSTs were contained in the EDR Report.

Currently, land use in the project area is predominantly pasture and cropland. Some forested areas are located along the western project boundary and in the northeastern corner of the project site. The naval lease parcel is predominantly cropland/pasture and previously developed land, with a small portion of undeveloped forest. The project site was predominantly owned and operated as part of the U.S. NAS Memphis. Naval property was previously transferred to private ownership (MIDB) prior to SRC acquisition for the Millington Solar Facility.

The project site has generally consisted of agricultural land dating back to at least the late 1930s. Agricultural equipment, 3- and 5-gallon gasoline canisters, and municipal and yard waste 55-gallon drums were noted during the site reconnaissance. The materials would be removed prior to construction completion, and will be disposed of as solid waste.

The majority of the structures on site consist of barns formerly used for livestock and storage for hay/feed. A former office building, likely for military use, is located along Kerrville Rosemark Road, and a storage building is located at the pond access area. The buildings, barns, and other structures will be demolished for construction of the solar facility. Three retired bunkers remain on site and will be demolished once construction of the solar facility begins. The bunkers were historically used for storage of unknown materials associated with the NSA, including the suspected storage of munitions (HDR 2017). The bunkers and other structures within the project area may contain asbestos-containing materials (ACM) and lead-based paints (LBP). ACM and LBP material above regulated levels require remediation and specialized demolition protocols. ACM is defined by EPA as any material containing greater than 1 percent of asbestos. LBP is material with a lead content above the regulated lead amount (5,000 part per million/ppm). On March 6, 2017, Environmental Compliance & Testing (ECT) conducted asbestos and LBP sampling of the project site to identify and sample suspect materials associated with the planned demolitions of the structures at the site (ECT 2017).

Twenty nine samples were taken from the on-site resources that could potentially produce positive results for ACM or lead. Four of the twenty nine samples taken for ACMs produced positive results for ACM. All four ACM samples were from the same bunker on the south side of Kerrville Rosemark Road west of Attu Extended. The exact demolition methods utilized for this structure will determine which OSHA asbestos work protocols should be implemented to ensure the safety and protection for anyone involved in the handling, removal, demolition, or disposal of

these materials. Six materials sampled for LBP produced results above the regulated lead amount (5,000 ppm). These materials came from the small red block building on the north side of Kerrville Rosemark Road west of Attu Extended, from the large barn on the west side of Kerrville Rosemark Road west of Attu Extended, from the bunker on the east side of Kerrville Rosemark Road after the road turns north, and the bunker on the west side of Attu Extended south of Kerrville Rosemark Road. The exact demolition methods for each structure will determine which OSHA LBP work protocols should be implemented to ensure the safety and protection for anyone involved in the handling, removal, demolition, or disposal of these materials (ECT 2017).

The project area is located in the city of Millington, Shelby County. Solid waste in Millington is managed by the Shelby County Municipal Solid Waste Region through the Shelby County government offices. The Shelby County Municipal Solid Waste Region consists of Shelby County and includes the City of Millington. Nonhazardous wastes, including construction wastes, will be hauled to an operating Class I facility Hazardous wastes are expected to be used for equipment purposes only. Vendors and suppliers will be responsible for removal of drums, barrels, and material containing hazardous waste in accordance with applicable state and federal regulations.

3.10.2 Environmental Consequences

This section describes the potential impacts to waste management should the No Action or Proposed Action Alternative be implemented.

3.10.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no project related impacts to waste management resources would occur. Existing land use would be expected to remain a mix of pastureland and undeveloped land, and existing waste management conditions would be expected to remain as they are at present.

3.10.2.2 Proposed Action Alternative

Construction of the Proposed Action would result in the generation of hazardous and nonhazardous solid and liquid waste in the form of construction debris, oils, packaging materials, and general construction waste. Under the Proposed Action it is anticipated that a total of approximately 120 gallons of hazardous waste would be generated for the duration of the construction. An additional 37,300 cubic yards of nonhazardous solid waste (932 loads at 40 cubic yards each) would be generated at the project site during construction. Nonhazardous wastes would include construction debris and general trash, including pallets and broken down cardboard module boxes.

Materials suitable for soil compaction activities such as gravel and soils would be brought to the project site as needed and off-loaded at the designated road or building location for immediate dispersion. Materials unsuitable for compaction, such as mowed debris, would be removed and loaded immediately for subsequent disposal at an acceptable off-site location. Contaminated grading and mowing materials are not anticipated; however, if any such materials are

encountered during excavation, they would be disposed of at the nearest appropriate facility, to be determined by the vendor in accordance with applicable laws, ordinances, regulations, and standards.

Recognized Environmental Conditions

Based on the length of time the site had been farmed, TVA considers there to be a potential for residual herbicides and/or pesticides in the soil due to the historical land use. Historical agricultural use is considered a *de minimis* condition. ASTM defines a *de minimis* condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

Based on the signage noted during the site reconnaissance and interview information obtained from the Naval Environmental Officer, TVA considers there to be a potential for residual pesticides in the soil at the naval housing (cottages) due to recent termite spraying and localized injections. Pesticides use is considered a *de minimis* condition.

No indication of leaks or stressed vegetation was noted around the agricultural equipment, 3- and 5-gallon gasoline canisters, and 55-gallon drums of municipal waste. SR Millington, LLC personnel reported these materials would be removed prior to construction completion. These are considered a waste management issue. Both these conditions do not meet the definition of a REC. Based on the above-detailed findings, RECs have not been identified in association with the Millington Solar Facility.

Hazardous Materials Management

During construction, all hazardous materials would be stored on site in storage tanks, vessels, or other appropriate containers specifically designed for the characteristics of the materials to be stored. Storage conex boxes and work trailers would be located on the project site. The storage facilities would include secondary containment in case of tank or vessel failure. Construction- and decommissioning-related hazardous materials stored on site would primarily be liquids such as used oil, nitrogen, diesel fuel, gasoline, hydraulic fluid, and other lubricants associated with construction equipment. Safety Data Sheets for all applicable materials present on site would be made readily available to on-site personnel.

Fueling of some construction vehicles would occur in the construction area. Other mobile equipment would return to the on-site laydown area for refueling. Special procedures would be identified to minimize the potential for fuel spills, and spill control kits would be carried on all refueling vehicles for activities such as refueling, vehicle or equipment maintenance procedures, waste removal and tank clean-out. A fuel truck may be stored on site for approximately 4 months during site grading of the project site. During the majority of the construction period, fuel would be stored on site in aboveground double-walled storage tanks with built-in containment. The total volume of the on-site tanks would exceed 1,320 gallons, the threshold above which a Spill Prevention, Countermeasure and Control (SPCC) Plan may be required (40 CFR part 112).

During operations, bulk chemicals would be stored in storage tanks; other chemicals would be stored in returnable delivery containers. Chemical storage and chemical feed areas would be designed to contain leaks and spills. The transport, storage, handling, and use of all chemicals would be conducted in accordance with applicable laws, ordinances, regulations, and standards. Oil on site would be used in the 18 transformers. Each transformer would contain approximately 550 to 650 gallons of oil/hydraulic fluid to support the function of the device and the on-site substation transformer would contain approximately 3,000 gallons of oil/hydraulic fluid; therefore, approximately 13,000 gallons of oil would be on site for equipment operation, which would exceed the 1,320 gallon threshold for an SPCC plan. The facility would fall under USEPA's SPCC requirements of "oil-filled operational equipment" and a Tier I Qualified Facility; therefore, no double-walled protection would be required and the SPCC plan would not have to be certified by a Professional Engineer (USEPA 2006 and 2011b). The SPCC plan would be prepared by a SR Millington, LLC contractor prior to construction to prevent oil discharges during facility operations. The contractor will coordinate with NSA Mid-South for any additional requirements regarding activities on Navy property.

The quantities of hazardous materials stored on site would be evaluated to identify the required usage and to maintain sufficient inventories to meet use rates without stockpiling excess chemicals. Chemicals that could be present during construction, operation and maintenance of the Proposed Project include diesel fuel, lubricants, mineral and FR3 insulating oil, sodium hexafluoride, and welding gases.

SRC would develop and implement a variety of plans and programs to ensure safe handling, storage, and use of hazardous materials (e.g., Hazardous Material Business Plan). Facility personnel would be supplied with appropriate personal protective equipment (PPE) and would be properly trained in the use of PPE as well as the handling, use, and cleanup of hazardous materials used at the facility and the procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials would be stored on site.

In addition to the chemicals listed above, small quantities (less than 55 gallons, 500 pounds or 200 cubic feet) of janitorial supplies, office supplies, laboratory supplies, paint, degreasers, herbicides, pesticides, air conditioning fluids (chlorofluorocarbons [CFC]), gasoline, hydraulic fluid, propane, and welding rods typical of those purchased from retail outlets may also be stored and used at the facility. Flammable materials (e.g., paints, solvents) would be stored in flammable material storage cabinet(s) with built-in containment sumps. Due to the small quantities involved and the controlled environment, a spill could be cleaned up without significant environmental consequences.

Hazardous Waste

Small quantities of hazardous wastes would be generated during construction, operation and maintenance and decommissioning. Hazardous wastes generated during the construction phase would include used oil, hydraulic fluid, and other lubricants associated with construction equipment. Hazardous solid and liquid waste streams that could be generated during operation of the proposed Project include substances such as used hydraulic fluids, used oils, greases, filters, etc., as well as spent cleaning solutions and spent batteries. Hazardous wastes

generated and disposed of during decommissioning would include diesel fuel, hydraulic fuel and lubricating oil. To the extent possible, all hazardous wastes would be recycled. Liquid hazardous wastes would be removed to a professional disposal location after use. Waste collection and disposal would be conducted in accordance with applicable regulatory requirements to minimize health and safety effects. Vendors and suppliers will be responsible for the removal of barrels/drums and material containing hazardous waste. No waste oil shall be disposed of within the site, access, or ROWs, on the related construction site or its access roads.

SR Millington, LLC (or its contractor) would obtain a hazardous waste generator identification number from the State of Tennessee prior to generating any hazardous waste. All spills on the solar facility would be reported to TDEC. A sampling and cleanup report would be prepared for the solar facility and sent to TDEC to document each spill and clean up. Each spill, regardless of amount, would be cleaned up within 48 hours and a spill report completed. Copies of all spill and cleanup reports would be kept on site.

Solid (Nonhazardous) Waste

Construction, operation and maintenance, and decommissioning would generate nonhazardous solid wastes. Facility-related wastes generated during all phases of the proposed Project would include oily rags, worn or broken metal and machine parts, defective or broken electrical materials, other scrap metal and plastic, broken down module boxes, empty containers, paper, glass, and other miscellaneous solid wastes including the typical refuse generated by workers. These materials would be disposed by means of contracted refuse collection and recycling services. Waste collection and disposal would be in accordance with applicable regulatory requirements to minimize health and safety effects. Decommissioned equipment and materials, including PV panels, racks, and transformers would be recycled. Materials that cannot be recycled would be disposed of at an approved facility to be determined by Evergreen Recycling and other designated contractors.

Designated TVA and/or contractor and subcontractor(s) personnel will be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Records of the amounts generated shall be provided to the site's or project's designated environmental specialist.

Information on universal wastes anticipated to be generated during Project construction is provided in Table 12. Universal wastes and unusable materials would be handled, stored, and managed in accordance with Tennessee Universal Waste requirements.

Table 12. Summary of construction waste streams and management methods.

Waste stream and classification	Origin and composition		Estimated frequency of generation	On-site treatment	Waste management method/off-site treatment
Construction waste–hazardous	Empty hazardous material containers		Intermittent	None	Return to vendor
Construction waste–hazardous	Used oil, hydraulic fluid, oily rags		Intermittent	None	Recycle, remove to off-site disposal location
Construction waste–non hazardous	Steel, glass, plastic, wood/pallets, cardboard, paper		Intermittent	None	Recycle wherever possible, otherwise dispose to Class I landfill
Sanitary waste–nonhazardous	Portable chemical toilets – sanitary waste		Periodically pumped to tanker truck by licensed contractors	None	Ship to sanitary wastewater treatment plant

The operation of the solar facility and associated electrical lines is expected to generate small quantities of hazardous wastes and nonhazardous wastes. The types of waste and their estimated volumes are summarized in Table 13.

Table 13. Summary of operation waste streams and management methods.

Waste stream and classification	Origin and composition	Estimated amount	Estimated frequency of generation	Waste management method	
				On site	Off site
Used hydraulic fluid, oils and grease–petroleum-related wastes	Tracker drives, hydraulic equipment	1,000 gallons/year	Intermittent	Accumulate for <90 days	Recycle
Oily rags, oil absorbent, and oil filters– petroleum-related wastes	Various	One 55-gallon drum per month	Intermittent	Accumulate for <90 days	Sent off site for recovery or disposed at Class I landfill

Waste stream and classification	Origin and composition	Estimated amount	Estimated frequency of generation	Waste management method	
				On site	Off site
Spent batteries–hazardous	Lead acid/lithium ion	1,000	Every 10 years	Accumulate for <90 days	Recycle

Wastewater

Portable chemical toilets would be provided and maintained by a certified vendor for construction workers. These toilets would be pumped out regularly and the sewage would be transported by tanker truck to a publicly owned wastewater treatment facility that accepts pump out. The toilets would not be located closer than 100 feet to any stream or wetland. No portable or permanent toilet facilities would be on site during facility operation. No adverse effects are anticipated from wastewater treatment and disposal.

3.11 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

This section describes an overview of existing public health and safety, and the potential impacts associated with the No Action and Proposed Action Alternatives. Public health issues include emergency response and preparedness to ensure project construction and operations do not pose a threat to public health and safety. Safety issues include occupational (worker) safety in compliance with the OSHA standards.

3.11.1 Affected Environment

The project site is currently private property. Land use on the project site is primarily pasture. Since the land occupied by the project site would not be used by, or accessible to the general public, there are no current public health and safety issues.

Public emergency services in the area include Urgent Care centers, law enforcement services, and fire protection services. The NSA Mid-South Branch Health Clinic is the closest hospital to the project site, located south of Navy Road on Singleton Avenue, approximately 2 miles (4 minutes) from the project site. The Methodist North Hospital is the next closest hospital, located approximately 11 miles and 15 to 20 minutes from the project site. Law enforcement services in the city of Millington are provided by the Millington Police Department; Shelby County law enforcement services are provided by the Shelby County Sheriff's Department in the city of Memphis. The Millington Police Department is located in Millington, approximately 3 miles (5 minutes) from the project site. Fire protection services are provided by the Millington City Fire Department and the Shelby County Fire Department (station 64), located approximately 4 miles (10 minutes) and 0.50 mile (2 minutes), respectively, from the project site. The Tennessee Emergency Management Agency has the responsibility and authority to coordinate with state and local agencies in the event of a release of hazardous materials in association with project activities.

3.11.2 Environmental Consequences

This section describes the potential impacts to public safety should the No Action or Proposed Action Alternative be implemented.

3.11.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no project related impacts on public health and safety would result. Existing land use would be expected to remain a mix of pastureland and forest land and existing public health and safety issues would be expected to remain as they are at present.

3.11.2.2 Proposed Action Alternative

Workers at the proposed solar facility and associated electrical lines would have an increased safety risk associated with the construction activities. However, because construction work has known hazards, standard practice is for contractors to establish and maintain health and safety plans in compliance with OSHA regulations. Such health and safety plans emphasize BMPs for site safety management to minimize potential risks to workers. Examples of BMPs include employee safety orientations; establishment of work procedures and programs for site activities; use of equipment guards, emergency shutdown procedures, lockout procedures, site housekeeping, personal protective equipment; regular safety inspections; and plans and procedures to identify and resolve hazards.

Potential public health and safety hazards could result in association with the flow of construction traffic along the public roadways. Adjacent residences located along Bethuel Road, which would be used by construction traffic to access the project site, would see increased commercial and industrial traffic. Awareness of these residences and establishment of traffic procedures to minimize potential safety concerns should be addressed in the health and safety plans established and followed by the construction team.

Minimal amounts of fuel for construction vehicles would be kept on site during construction of the solar facility. BMPs would be implemented to minimize the potential of a spill and to instruct on-site workers on how to contain and clean up any potential spills. The project site would be surrounded by security fencing during both construction and operational phases and access gates would normally remain locked. General public health and safety would not be at risk in the event of an accidental spill on site.

Emergency response for the project site would be provided by the local, regional, and state law enforcement, fire, and emergency responders described in Section 3.11.1.

No public health or safety hazards would be anticipated as a result of operations. Overall, impacts to public health and safety in association with implementation of the Proposed Action would be considered temporary and minor.

3.12 TRANSPORTATION

This section describes an overview of existing transportation resources, and the potential impacts on these transportation resources that would be associated with the No Action and Proposed Action Alternatives. Components of transportation resources that are analyzed include roads, traffic, railroads and airports.

3.12.1 Affected Environment

3.12.1.1 Roads

The project area is located in the city of Millington, Tennessee in the northern portion of Shelby County. The project site is just over 1.8 miles from the intersection of West Union Road and US 51. Bethuel Road is a two-lane paved public road that follows along most of the eastern property boundary intersecting with Navy Road approximately ¼ mile to the southeast of the project site boundary (Figure 2). US 51 is a north/south route that goes through Millington and Memphis, approximately 15.5 miles to the southeast, and intersects with Interstate 40 (I-40). Several roads extend through the project site. Kerrville Rosemark Road and Attu Street/Attu Extended go through the project area, intersecting near the center and providing access to the site. In the southeastern portion of the site several roads which previously served residential home sites are no longer present. Kerrville Rosemark Road is privately owned by SRC and Attu Street/Attu Extended is owned by SRC up to the point of the Navy's property where it becomes the Navy's road once on the base. Upon purchase of the MIDB parcels by SRC on May 27, 2016, Kerrville Rosemark Road and Attu Street/Attu Extended became SRC-owned roads and would be leased by SR Millington, LLC for the duration of the project. Prior to SRC's ownership, the roads were owned by the MIDB and have never been publicly dedicated; however, the roads are used by the public. The. Navy distribution line would follow Bethuel Road and Navy Road, and cross beneath Navy Road before crossing over McCain Street and Patrol Road at the intersection. The proposed Shelby-Millington Solar 161-kV Transmission Line would cross Bethuel Road, follow parallel to Center College Road, and then turn north after crossing Armour Road, and cross Mudville Road before turning east to connect to the Shelby 500-kV substation.

3.12.1.2 Traffic

Existing traffic volumes were determined using Average Annual Daily Traffic (AADT) counts measured at existing TDOT stations. The 2015 AADT count for Bethuel Road adjacent to the project site consisted of 2,141 vehicles at station 241. Near the intersection of Bethuel Road and Navy Road, there were 2,934 vehicles. On Navy Road, south of the project site, there were 5,484 daily vehicles according to station 551 (TDOT 2016). The county roads around the project site support levels of traffic relatively typical for rural Tennessee.

3.12.1.3 Rail and Air Traffic

The closest rail line is 0.6 mile northwest of the project site. The rail line is operated by Canadian National. The tracks are separated from the project site by the Millington Regional Jetport.

The closest major airport is the Memphis International Airport, in Memphis, Tennessee, approximately 21 miles southwest of the project area. The closest regional airport is the Millington Regional Jetport located adjacent to the northwest portion of the site, formally a part of U.S. NAS Memphis. The airport consists of one runway 8,000 feet long. The airport is home to both a flight school and a commercial driving school. Direct approaches should not lead planes over the project site (Millington Regional Jetport 2017).

3.12.2 Environmental Consequences

This section describes the potential impacts to transportation resources should the No Action or Proposed Action Alternative be implemented.

3.12.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no project related impacts on transportation resources would result. Existing land use would be expected to remain a mix of pastureland and forest land and the existing transportation network and traffic conditions would be expected to remain as they are at present.

3.12.2.2 Proposed Action Alternative

The construction and operation of the proposed solar facility and electrical lines would have no effect on operation of the airports in the region. The operation of the solar facility and electrical lines would not affect commercial air passenger or freight traffic in the region and would not adversely affect any crop dusters operating in the vicinity of the project area. According to the glint/glare analysis (Section 3.5.2.2), the proposed Project would not cause glare that would be visible to either the air traffic control tower or either runway approach based on the proposed Project design and size.

During construction of the proposed solar facility, an average crew of approximately 150 with a maximum of 200 workers would be present at the project site from approximately 7 A.M. to 5 P.M., 7 days a week during winter months and 3 A.M. to 2 P.M. during summer months. The work on site before daylight hours would take place inside the construction trailer with internal lighting. A majority of these workers would likely come from the local or regional area. The other workers would come from outside the region and many would likely stay in local hotels in Millington. Workers would either drive their own vehicles or carpool to the project site. Parking would be on site during the day. Some of the work teams would likely visit local restaurants and businesses during working hours. Additional traffic due to deliveries and waste removal would consist of a maximum of approximately 15 vehicles per day during construction.

Traffic flow around the work site would, therefore, be heaviest at the beginning of the work day, at lunch, and at the end of the work day. Deliveries and most workers would access the project site from the east on Bethuel Road. No major industries are located along Bethuel Road and a limited number of residences are present alongside the road in the vicinity of the project site. Some traffic to Millington Elementary School on Bethuel Road and the University of Memphis-Millington Campus on Navy Road would likely travel north and south on Bethuel Road, which intersects Kerrville Rosemark Road near the main access road to the solar facility. The majority

of traffic to the elementary school is likely from Navy Road south of the school. The majority of traffic to the University of Memphis-Millington Campus is likely from Navy Road east and west of the school, and south of the project site. Should traffic flow be a problem, SR Millington, LLC would consider staggered work shifts to space out the flow of traffic to and from the project site. SR Millington, LLC would also consider posting a flag person during the heavy commute periods to manage traffic flow and to prioritize access for local residents. Use of such mitigation measures would minimize potential adverse impacts to traffic and transportation to less than significant levels.

Construction equipment and material delivery would require, at peak of deliveries, approximately 14 semitractor trailer trucks or other large vehicles visiting the project site each day during the construction period, including tracker and module deliveries. The project site can be accessed via routes which do not have load restrictions. These vehicles should be easily accommodated by existing roadways; therefore, only minor impacts to transportation resources in the local area would be anticipated as a result of construction vehicle activity.

Several on-site maintenance access roads would be maintained on the project site. Following construction, the gravel roads would be maintained to allow periodic access for site inspection and maintenance. They would be closed to through traffic. Attu Road/Attu Extended and Kerrville Rosemark Road would be closed to the public through the project site and gated with access only to SR Millington, LLC, its agents, and contractors. Due to the closure of these roads to through traffic, the traveling public would have to go around the project site via Bethuel Road to its intersection with Kerrville Rosemark Road north of the project site or to its intersection with Navy Road south of the project site, for a total detour of less than 1 mile, which would result in a minor direct impact.

Due to the project area's proximity to the city of Millington, possible minor traffic impacts along Navy Road through the city of Millington could occur as workers could potentially commute from downtown Millington. However, the proposed workforce would consist of a maximum of 200 employees for only part of the construction period; therefore, the addition of these vehicles to the existing traffic on Navy Road would be considered minor.

The solar facility is not manned during operation; however, maintenance is required quarterly and for equipment failures and annually for preventative maintenance and would require minimal personnel. Therefore, the operation of the solar facility would not have a noticeable impact on the local roadways.

Overall, direct impacts to transportation resources associated with implementation of the Proposed Action would be anticipated to be minor and mitigated. The Proposed Action would not result in any indirect impacts to transportation.

3.13 SOCIOECONOMICS

This section describes an overview of existing socioeconomic conditions within the project area and the potential impacts that would be associated with the No Action and Proposed Action

Alternatives. Components of socioeconomic resources that are analyzed include population, employment, and income.

3.13.1 Affected Environment

The proposed project area is located in the northern portion of Shelby County, Tennessee in the city of Millington, approximately 2 miles northeast of the city center. The project area falls within Census Tract (CT) 204, CT 202.10, and CT 207 for socioeconomic resources. The proposed Project is predominantly in CT 204 with only a very small portion (approximately 7.5 acres, or 1.7 percent of the 438-acre property) of the project site falling within CT 202.10. The proposed transmission line crosses CT 202.10 and 207 (Figure 21). CT 204 contains the NSA Mid-South and Millington Regional Jetport. A portion of CT 204 was formerly U.S. NAS Memphis, which was transferred in 1999 during BRAC to MIDB.

3.13.2 Population

The population of Shelby County, as reported in the 2010 U.S. Census of Population, is 927,644 and 10,176 of whom live in the city of Millington (USCB 2010). As projected by the State of Tennessee, the population of Shelby County would be about 1,037,532 by 2030 (University of Tennessee 2009). CT 204, which contains the majority of the project site, including the proposed distribution line, has a population of 1,118, which is a decline from the previous decade. The population of CT 204 is likely affected by the transient nature of military personnel at NSA Mid-South and the BRAC of U.S. NAS Memphis in 1999. CT 202.10, which contains a small area in the northeastern corner of the project site and a portion of the proposed transmission line, has a population of 6,292. CT 207, which contains the majority of the proposed transmission line, has a population of 1,995 (USCB 2010). The 2010 USCB total population is 2,818 in a 1-mile radius of the project site (not including the transmission line corridor) (USEPA EJScreen 2016). Population trends and projections are presented in Table 14.

Table 14. 1990–2030 population data.

Area	1990	2000	2010	Projection 2030	Percent change 1990-2010	Percent change 2010-2030
CT 202.10	-	5,957	6,292	N/A	5.6[a]	–
CT 204	-	2,735	1,118	N/A	-59.1[a]	–
CT 207	-	1,995	2,584	N/A	22.8[a]	-
City of Millington	17,866	10,433	10,176	10,627	-43.0	4.4
Shelby County	826,330	897,472	927,644	1,037,532	12.3	11.8
Tennessee	4,877,185	5,689,283	6,356,585	7,397,302	30.3	16.4
United States	248,709,873	281,421,906	308,745,538	363,584,435	24.1	17.8

[a] Percent change calculated between 2000 and 2010 based on lack of data for 1990.***Source:*** USCB 1990; USCB 1996; USCB 2000; USCB 2005; USCB 2010:

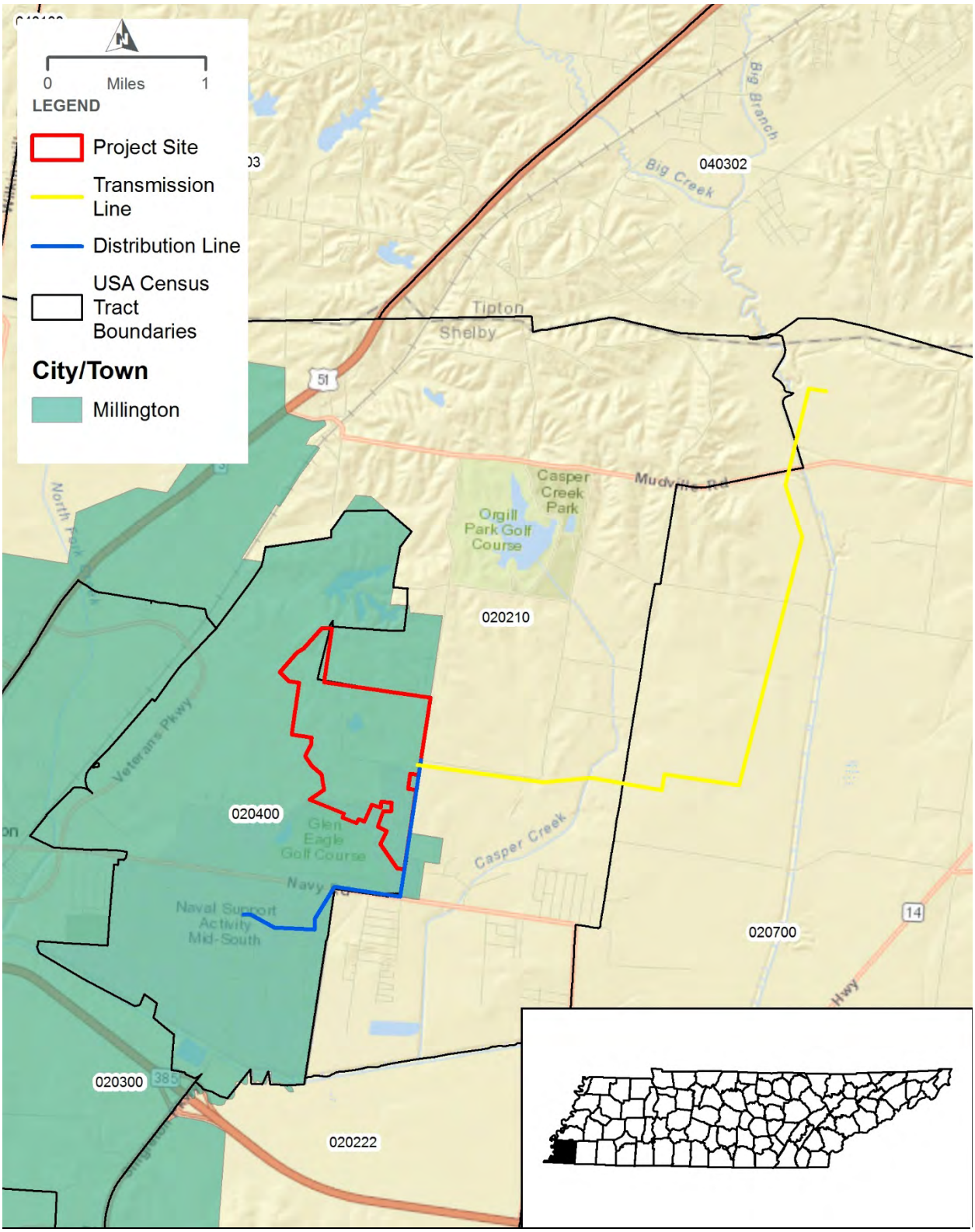

Figure 21. 2010 U.S. Census tracts in Shelby County.

3.13.2.1 Employment and Income

The City of Millington reports manufacturing (20 percent), public administration/government (19 percent), and retail trade (11 percent) as its top three industries (City-Data 2017). Shelby County had a total employment in 2015 of about 484,493 jobs (Table 15). The greatest percentage of employment in Shelby County is within government or retail and service industries, likely due to the inclusion of the City of Memphis (Tennessee Dept. of Labor and Workforce Development [TDLWD] 2017). Manufacturing within the City of Millington is greater than the county share of 7.0 percent, the state share of 11.8 percent, and the national share of 8.4 percent. City employment in public administration or government is also greater than county, state, and national shares and may be a result of employment associated with NSA Mid-South. The January 2017 unemployment rate for Shelby County was 6.3 percent; this represents an increase of 1 percent from January 2016 and is higher than the state unemployment rate of 5.7 percent (TDLWD 2017). Unemployment for the City of Millington was 6.7 percent in 2015 (City-Data 2017).

Table 15. 2015 Employment data.

Area	Average annual employment	Percent farming	Percent manufacturing	Percent retail trade	Percent government
Shelby County	484,493	0.0	7.0	10.3	12.4
Tennessee	2,822,334	0.3	11.8	11.6	14.4
United States	146,603,000	1.0	8.4	10.8	16.7

Source: U.S. Bureau of Economic Analysis (BEA) 2015, TDLWD 2015.

Per capita personal income for Shelby County in 2015 was $45,153, which is greater than the per capita income for the state of Tennessee of $42,127. Shelby County's per capita income is 93.8 percent of the national average and 7 percent greater than the state average (Table 16).

Table 16. 2015 Per capita personal income data.

Area	Per capita personal income (U.S. dollars)	Percent of U.S.
Shelby County	45,153	93.8
Tennessee	42,127	87.4
United States	48,130	100.0

Source: BEA 2015

3.13.3 Environmental Consequences

This section describes the potential impacts to socioeconomic resources should the Proposed Action or No Action Alternative be implemented. Social and economic issues considered for evaluation within the impact area include change to current and projected population levels, change in expenditures for goods and services, and short-term or long-term impacts on employment and income.

3.13.3.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no short-term beneficial socioeconomic impacts from the proposed project would occur. Existing land use would be expected to remain a mix of pastureland and forest land and existing socioeconomic conditions would be expected to remain as they are at present.

3.13.3.2 Proposed Action Alternative

Under the Proposed Action, a new solar facility would be built in the project area. Construction activities at the project site would take approximately 15 months to complete with an average crew of 150 to 200 workers at the site during the peak of construction. Workers would include a mix of general laborers, electrical technicians, and journeyman-level electricians. Work would generally occur 7 days a week from 3 A.M. to 2 P.M. in the summer months and from 7 A.M. to 5 P.M. during the winter months. Short-term beneficial economic impacts would result from construction activities associated with the Project, including the purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers were obtained. It is likely some construction materials and services would be purchased locally in the Shelby County area, as well as in adjacent counties. Also, the majority of the construction workforce would likely be from local or regional sources. A small portion of the workforce would come from out-of-state. The direct impact to the economy associated with construction would be short-term and beneficial.

The majority of the indirect employment and income impacts would be from expenditure of the wages earned by the workforce involved in construction activities, as well as the local workforce used to provide materials and services. Construction of the proposed facility, including the associated electrical lines, could have minor beneficial indirect impacts to population and short-term employment and income levels in Shelby County and the city of Millington.

During operation of the solar facility, a temporary workforce of one to two people would be on site for mowing the site every 3 months. One to two people would also be on site during quarterly inspections of the solar facility as well as annual preventative maintenance activities. Grounds maintenance and some other operation and maintenance activities would be conducted by local contractors. Therefore, operations of the solar facility would have a small positive impact on employment in Shelby County.

Overall, socioeconomic impacts for the operation of the proposed solar facility would be positive and long-term, although small relative to the total economy of the region. The local tax base would increase from construction of the solar facility and would be most beneficial to the Shelby County area. Additionally, the local governments (Shelby County and City of Millington) would not have to provide any of the traditional government services typically associated with a large capital investment, such as water, sewer and schools.

3.14 ENVIRONMENTAL JUSTICE

This section describes an overview of environmental justice considerations within the project area and the potential environmental justice impacts that would be associated with the No Action and Proposed Action Alternatives. Components of environmental justice that are analyzed include minority and low income population.

3.14.1 Affected Environment

E.O. 12898 (59 FR 7629) directs federal agencies to identify and address, as appropriate, potential disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Although TVA is not subject to this E.O., its policy is to consider environmental justice in its environmental reviews. This section provides demographic information that characterizes the distribution of minority populations and low-income populations in the project area.

In identifying minority and low-income populations, the following CEQ definitions of minority individuals and populations and low-income populations were used:

- *Minority individuals.* Individuals who identify themselves as members of the following population groups: American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Black, Hispanic, or two or more races.
- *Minority populations.* Minority populations are identified where (1) the minority population of an affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.
- *Low-income populations.* Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P-60, on Income and Poverty.

According to CEQ guidance, U.S. Census data are typically used to determine minority and low-income population percentages in the affected area of a project in order to conduct a quantitative assessment of potential environmental justice impacts. The project area that would be affected by the Proposed Action is located in the northern part of Shelby County, within the Millington city limits. CT 204 Block Group 1, CT 202.10 Block Group 2, and CT 207 Block Groups 1 and 2, which contains the proposed Project are identified as the impact area for environmental justice. The proposed Project is predominantly in CT 204 with only a very small portion (approximately 7.5 acres, or 1.7 percent of the 438-acre property) of the project site falling within CT 202.10 and the proposed transmission line crossing CT 207 and a portion of CT 202.10.

3.14.1.1 Minority Population

Minorities constitute 59.4 percent of the total population in Shelby County as of the 2010 U.S. Census of Population (Table 17). CT 204 has a minority population of 36.8 percent and CT 202.10 has a minority population of 36.9 percent. CT 207 has a minority population of 11.2 percent. The four block groups that encompass the Project have an average minority population

of 20.1 percent, considerably lower than the other areas listed in Table 17 including the city of Millington (34.8 percent), the county (59.4 percent), the state of Tennessee (22.4 percent), and the United States (27.6 percent). Within a 1-mile radius of the project site, the minority population is 42 percent (USEPA EJScreen 2016)[1], which is greater than reported minority populations in CT 202.10, 204, CT 207, and the City of Millington.

Table 17. 2010 Minority population data.

Area	Total population	Minority population	Percent minority population
Block Group 2, CT 202.10	1,213	259	21.3
Block Group 1, CT 204	237	53	22.4
Block Group 1, CT 207	1,179	179	15.2
Block Group 2, CT 207	1,213	259	21.3
Census Tract 202.10	6,292	2,322	36.9
Census Tract 204	1,118	392	36.8
Census Tract 207	2,584	290	11.2
City of Millington	10,176	3,538	34.8
Shelby County	927,644	551,374	59.4
Tennessee	6,346,105	1,424,157	22.4
United States	308,745,538	85,192,273	27.6

Source: USCB 2010

3.14.2 Poverty

The estimated portion of the population in Shelby County that had income below the poverty level at the end of 2015 was 21.4 percent (Table 18). The two census block groups that encompass the Project have an average of 3.2 percent of their population below the poverty level. This poverty rate is lower than that of the larger census tract (CT 204) that encompasses the majority of the Project (the poverty rate in CT 202.10, which encompasses less than 1 percent of the Project is 14.8 percent) and lower than the poverty rate for the city of Millington (19.5 percent). The poverty rate of the census block groups is lower than for the county (21.4 percent), the state (17.6 percent), and the United States (15.5 percent). Within a 1-mile radius of the project area, the low income population is 52 percent (USEPA EJScreen 2016)[2], which indicates that a low income population may be present in the immediate surrounding area that is not reflected in the Census Block or Tract data.

[1] The source of the minority data in EJScreen is USCB, Census 2010 Summary File 1.

[2] EJScreen defines low income populations as "Percent of individuals whose ratio of household income to poverty level in the past 12 months was less than 2 (as a fraction of individuals for whom ratio was determined)." Calculated from the USCB's American Community Survey 2010-2014.

Table 18. 2015 (Estimated) poverty level data.

Area	Total population	Persons below poverty level	Percent of persons below poverty level
Block Group 2, CT 202.10	1,334	84	6.3
Block Group 1, CT 204	93	0	0.0
Block Group 1, CT 207	1,228	99	8.1
Block Group 2, CT 207	1,334	84	6.29
Census Tract 202.10	5,656	839	14.8
Census Tract 204	1,168	17	1.5
Census Tract 207	2,384	139	5.8
City of Millington	10,772	2,097	19.5
Shelby County	919,879	196,471	21.4
Tennessee	6,339,352	1,117,594	17.6
United States	308,619,550	47,749,043	15.5

Source: USCB 2015

3.14.3 Environmental Consequences

This section describes the potential environmental justice impacts should the Proposed Action or No Action Alternative be implemented. According to the CEQ, adverse health effects to be evaluated within the context of environmental justice impacts may include bodily impairment, infirmity, illness, or death. Environmental effects may include ecological, cultural, human health, economic, or social impacts. Disproportionately high and adverse human health or environmental effects occur when the risk or rate of exposure to an environmental hazard or an impact or risk of an impact on the natural or physical environment for a minority or low-income population is high and appreciably exceeds the impact level for the general population or for another appropriate comparison group (CEQ 1997).

3.14.3.1 No Action Alternative

Under the No Action Alternative, there would be no changes to the project area attributable to the Proposed Action and therefore no disproportionately high and adverse direct or indirect impacts on minority or low-income populations.

3.14.3.2 Proposed Action Alternative

Based on the analysis presented in Section 3.14.1, residents of the census tracts containing the project site and electrical lines are not considered a minority or low-income population. The results of the EJScreen indicate low-income population within 1 mile of the proposed Project. Based on the analysis of impacts for all resource areas presented in this EA, it was determined that there would be no significant adverse health impacts on members of the public or significant adverse environmental impacts on the physical environment (water, air, aquatic, and terrestrial resources) and socioeconomic conditions. Therefore, there would be no

disproportionately high or any adverse direct or indirect impacts on minority or low-income populations due to human health or environmental effects resulting from the Proposed Action.

CHAPTER 4

4.0 CUMULATIVE IMPACTS

Cumulative impacts are defined as the effects of the Proposed Action when considered together with other past, present, and reasonably foreseeable future Action. Chapter 3, Affected Environment and Environmental Consequences, presents information about past and present environmental conditions, as well as future trends, where appropriate. This chapter addresses the cumulative impacts of the Project and any reasonably foreseeable action in the vicinity.

Desktop research of potential past, present, and future actions in the Shelby County, Tennessee area was conducted. Resources examined included:

- Local and regional news sources;
- City of Millington government website records, including planning commission meetings, city meeting minutes, and public notices;
- Chamber of Commerce websites and meeting minutes; and
- TDOT website.

The proposed Project would result in minor direct impacts to land use, water resources, biological resources, geological resources and farmlands, visual resources, transportation, noise, and air quality.

4.1 FEDERAL PROJECTS

This section addresses other projects with possible land use, water resources, biological resources, visual, geological resources and farmlands, noise, air quality, and transportation impacts. Two federal projects were identified in the vicinity of the project area. Interstate 69 (I-69) is a proposed highway that was identified as a priority in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). I-69 currently exists from the Michigan/Canada border to the northeast side of Indianapolis, Indiana. Congress passed legislation to extend the corridor from Indianapolis to the Lower Rio Grande Valley. The extension of the corridor incorporates several elements, including a new interstate route (I-69) that will serve Memphis, Tennessee. The proposed route has been divided into multiple segments, two of which are located in proximity to the proposed Project.

- Segment 8 begins at SR 385 (Paul Barrett Parkway) in Shelby County to the south of Millington and extends north to the I-155/US-412/US-51 interchange in Dyer County. Two alternative corridors for Segment 8 with various interchanges are currently being studied (TDOT 2017).
- Segment 9 begins near the I-55/SR 304 Interchange in Hernando, Mississippi, and extends north to near the intersection of US 51 and SR 385 in Millington, Tennessee. A Final Environmental Impact Statement and Record of Decision have been issued for this Segment of the I-69 project (TDOT 2017).

This proposed Project has the potential to contribute to cumulative impacts on land use, water resources, geological resources and farmlands, visual resources, noise, and air quality in the area. While many segments of the proposed I-69 would follow existing highway alignments, roads would need to be widened and new segments are proposed that would affect agricultural or undeveloped land. The proposed highway would likely affect wetlands and surface waters; however, compensatory mitigation would be required to offset unavoidable impacts to these resources. The I-69 project's effects on these resources, as well as noise, visual resources, and air quality, have been or are being evaluated under their NEPA analysis. The proposed solar project at Millington is expected to result in minor direct impacts and would not contribute to a cumulative adverse effect on these resources.

The Plains and Eastern Clean Line high voltage direct current (HVDC) transmission line is a proposed HVDC transmission line by Clean Line Energy Partners that would extend from the Oklahoma panhandle eastward across Oklahoma, Arkansas, and some of western Tennessee to terminate at a large DC to AC converter station just north of TVA's Shelby 500-kV Substation. A very short high voltage AC line from the converter station to TVA's Shelby 500-kV Substation and the power imported from the Oklahoma/Texas area would be transmitted across the TVA transmission network to purchasers. The Department of Energy (DOE) completed a Final Environmental Impact Statement (FEIS) for the project and issued a Record of decision (ROD). TVA has been negotiating connection and power terms with Clean Line Energy Partners, but has not yet issued its formal approval/agreement. TVA's Shelby 500-kV substation is in proximity to the northern end of the proposed TVA transmission line that is part of the Millington solar project.

The Plains and Eastern Clean Line is reasonably foreseeable and would affect land use, water resources, geological resources and farmlands, visual resources, noise, and air quality, as well as threatened and endangered species and other resources. The project's potential environmental impacts have been evaluated under NEPA and the FEIS did not identify widespread significant impacts as a result of construction or operations and maintenance, and environmental protection measures would avoid or minimize the potential for significant environmental effects. If the Plains and Eastern Clean Line is built, there will be additional transmission line construction and its associated impacts in the overall project area, as well as the impacts of building the large inverter station (Plains and Eastern Clean Line 2017). However, the proposed Millington Solar Facility project is expected to result in minor direct impacts; and is unlikely to result in significant cumulative impacts to these resources and to the project area.

4.2 STATE AND LOCAL PROJECTS

The City of Millington recently completed Veterans Parkway, a $25 million project that created access to prime industrial property. Veterans Parkway crosses Navy Road and extends parallel to the west side of Millington Regional Jetport and then turns west. Veterans Parkway provides a grade-separated crossing over the Canadian National Railroad allowing direct access to Highway 51 to the north and south and Paul Barret Parkway (Highway 385) to the east. Veterans Parkway provides a direct connection to future Interstate 69 to the west and serves as

a bypass for traffic heading north and south on Highway 51. Veterans Parkway provides improved access to Millington's largest business/industrial area known as the West Tennessee Regional Business Center. This publicly owned business center covers approximately 1,900 acres and is located along an existing section of Veterans Parkway just north of Navy Road. Since Singleton Parkway through the naval base was closed to public travel after September 11, 2001 there has been limited access to this business center (Millington 2017). Commercial and industrial development in the Veterans Parkway is reasonably foreseeable, but given the nature of the impacts of the proposed solar facility, the Proposed Action is unlikely to result in significant adverse cumulative impacts.

CHAPTER 5

5.0 LIST OF PREPARERS

The preparers of this EA are listed below.

Table 19. EA project team

Name/Education	Experience	Project role
TVA		
Ashley A. Pilakowski NEPA Specialist B.S., Environmental Management	6 years in environmental planning and policy and NEPA compliance	NEPA compliance and document preparation
Michaelyn Harle Ph.D., Anthropology; M.A. Anthropology; B.A. Anthropology	15 years in cultural resource management	Cultural resources, NHPA Section 106 compliance
Britta P. Lees Biologist, Wetlands M.S., Botany-Wetlands Ecology Emphasis; B.A., Biology	14 years in wetlands assessments, botanical surveys, wetlands regulations, and/or NEPA compliance	Wetlands for transmission line
Adam J. Datillo Biologist, Botany M.S., Forestry; B.S., Natural resource Conservation	12 years in ecological restoration and plant ecology; 7 years in botany	Botany
Kim Pilarski-Hall Specialist, Wetlands and Natural Areas M.S., Geography, Minor Ecology	17 years in wetlands	Natural areas
Elizabeth B. Hamrick Biologist, Zoology M.S., Geography, Minor Ecology	4 years in Biological Surveys and Environmental Reviews	Wildlife; threatened and endangered terrestrial animals

Name/Education	Experience	Project role
Craig L. Phillips Biologist, Aquatic Community Ecology M.S., and B.S., Wildlife and Fisheries Science	10 years sampling and hydrologic determinations for streams and wet weather conveyances; 9 years in environmental reviews	Aquatic ecology, threatened and endangered aquatic species
Amos L. Smith, PG Solid Waste Specialist Education: B.S., Geology	29 years in environmental analyses and groundwater evaluations	Groundwater
Dana M. Vaughn Program Manager Environmental Support	12 years in natural resources and environmental compliance	Environmental resources coordination, document preparation
Emily Willard Program Manager, Environmental Permitting & Compliance B.S., Environmental Science	9 years in environmental compliance, preparation of environmental documents	Document preparation and review
Carrie C. Williamson, P.E., CFM Civil Engineer, Flood Risk Education: M.S., Civil Engineering; B.S., Civil Engineering	3 years in Floodplains and Flood Risk; 11 years in compliance monitoring; 3 years in river forecasting	Floodplains
Chevales Williams Water Specialist II B.S., Environmental Engineering services	12 years of experience in water quality monitoring and compliance; 11 years in NEPA planning and environmental	Surface water and soil erosion
HDR		
Renee Mulholland B.S., Marine Science; Masters of Earth and Environmental Resource Management (MEERM)	12 years in regulatory compliance, permitting, and NEPA documentation and project management	NEPA Task Manager, EA document preparation lead and document coordination, final QA/QC

Name/Education	Experience	Project role
Benjamin Burdette, EIT B.A., International/Global Studies M.S., Environmental/Environmental Health Engineering	Over 2 years in NEPA coordination and document preparation, and GIS mapping	Document preparation, GIS mapping
Jason McMaster, PWS B.S., Business Administration; B.S., Ecology; M.S., Environmental Science; M.A., Biology	10 years in combined regulatory compliance, construction compliance, stream and wetland delineations, permitting, and environmental review documentation	Document preparation/farmlands
Kelly Thames. PWS B.A., Environmental Science M.S., Plant Biology	6 years in ecology, biology, stream and wetland delineations, permitting, habitat evaluation and restoration, and GIS mapping	GIS mapping, jurisdictional delineation
Joshua Fletcher, RPA B.S., Architecture M.A. Archaeology	Over 20 years conducting archaeological research relating to NHPA and NEPA compliance	Cultural resources
Blair Goodman Wade, ENV SP B.S., Integrated Science and Technology, Environmental Science and GIS; Masters of Environmental Management (M.E.M.)	13 years in regulatory compliance, NEPA documentation, permitting, mitigation planning, and project management	EA document contributor, document QA/QC, jurisdictional delineation field work
Thomas Blackwell, PWS B.A. Natural Science (Geography); M.S., Environmental Resource Management	12 years in stream and wetland delineations and restoration design, permitting, NEPA documentation, and project management	Project Manager, EA document contributor and QA/QC, project coordination, jurisdictional delineation
Charles Nicholson B.S., Wildlife and Fisheries Science M.S., Wildlife Management PhD, Ecology and Evolutionary Biology	17 years in wildlife and endangered species research and management, 22 years in NEPA compliance	Document QA/QC

CHAPTER 6

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Appendices

Appendix A

Tennessee Valley Authority Right-of-Way Clearing Specifications

Tennessee Valley Authority Right-of-Way Clearing Specifications

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

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

2. Regulations - The clearing contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances including without limitation all air, water, solid and hazardous waste, noise, and nuisance laws, regulations, and ordinances. The contractor shall secure or ensure that TVA has secured all necessary permits or authorizations to conduct work on the acres shown on the drawings and plan and profile for the contract. The contractor's designated project manager will actively seek to prevent, control, monitor, and safely abate all commonly recognized forms of workplace and environmental pollution. Permits or authorizations and any necessary certifications of trained or licensed employees shall be documented with copies submitted to TVA's right-of-way inspector or construction environmental engineer before work begins. The contractor will be responsible for meeting all conditions specified in permits. Permit conditions shall be reviewed in prework discussions.

3. Land and Landscape Preservation - The clearing contractor shall exercise care to preserve the condition of cleared soils by avoiding as much compacting and deep scarring as possible. As soon as possible after initial disturbance of the soil and in accordance with any permit(s) or other state or local environmental regulatory requirements, cover material shall be placed to prevent erosion and sedimentation of water bodies or conveyances to surface water or groundwater. In areas outside the clearing, use, and access areas, the natural vegetation shall be protected from damage. The contractor and his employees must not deviate from delineated access routes or use areas and must enter the site at designated areas that will be marked. Clearing operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the remaining natural vegetation and adjacent surroundings in the vicinity of the work. In sensitive public or environmental areas, appropriate buffer zones shall be observed and the methods of clearing or reclearing modified to protect

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

4. Streamside Management Zones - The clearing contractor must leave as many rooted ground cover plants as possible in buffer zones along streams and other bodies of water or wet-weather conveyances thereto. In such streamside management zones (SMZ), tall-growing tree species (trees that would interfere with TVA's National Electrical Safety Code clearances) shall be cut, and the stumps may be treated to prevent resprouting. Low-growing trees identified by TVA as marginal electrical clearance problems may be cut, and then stump treated with growth regulators to allow low, slow-growing canopy development and active root growth. Only approved herbicides shall be used, and herbicide application shall be conducted by certified applicators from TVA's Transmission, Operations, and Maintenance (TOM) organization after initial clearing and construction. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment, such as a feller-buncher. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Disturbed soils in SMZs must be stabilized by appropriate methods immediately after the right-of-way is cleared. Stabilization must occur within the time frame specified in applicable storm water permits or regulations. Stumps within SMZs may be cut close to the ground but must not be removed or uprooted. Trees, limbs, and debris shall be immediately removed from streams, ditches, and wet areas using methods that will minimize dragging or scarring the banks or stream bottom. No debris will be left in the water or watercourse. Equipment will cross streams, ditches, or wet areas only at locations designated by TVA after the application of appropriate erosion control BMPs consistent with permit conditions or regulatory requirements.

5. Wetlands - In forested wetlands, tall trees will be cut near the ground, leaving stumps and roots in place. The cambium may be treated with herbicides applied by certified applicators from the TOM organization to prevent regrowth. Understory trees that must be initially cut and removed may be allowed to grow back or may be treated with tree growth regulators selectively to slow growth and increase the reclearing cycle. The decision will be situationally made based on existing ground cover, wetland type, and tree species since tall tree removal may "release" understory species and allow them to grow quickly to "electrical clearance problem" heights. In many circumstances, herbicides labeled for water and wetland use may be used in reclearing.

6. Sensitive Area Preservation - If prehistoric or historic artifacts or features that might be of archaeological significance are discovered during clearing or reclearing operations, the activity shall immediately cease within a 100-foot radius, and a TVA right-of-way inspector or construction environmental engineer and the Cultural Resources Program manager shall be notified. The site shall be protected and left as found until a determination about the resources, their significance, and site treatment is made by TVA's Cultural Resources Program. Work may continue beyond the finding zone and the 100-foot radius beyond its perimeter.

7. Water Quality Control - The contractor's clearing and disposal activities shall be performed using BMPs that will prevent erosion and entrance of spillage, contaminants, debris, and other pollutants or objectionable materials into drainage

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

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

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

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

9. Air Quality Control - The clearing or reclearing contractor shall take appropriate actions to limit the amount of air emissions created by clearing and disposal operations to well within the limits of clearing or burning permits and/or forestry or local fire department requirements. All operations must be conducted in a manner that prevents nuisance conditions or damage to adjacent land crops, dwellings, highways, or people.

10. Dust and Mud Control - Clearing activities shall be conducted in a manner that minimizes the creation of fugitive dust. This may require limitations as to type of equipment, allowable speeds, and routes utilized. Control measures such as water, gravel, etc., or similar measures may be used subject to TVA approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

11. Burning - The contractor shall obtain applicable permits and approvals to conduct controlled burning. The contractor will comply with all provisions of the permit, notification, or authorization including burning site locations, controlled draft, burning hours, and such other conditions as stipulated. If weather conditions such as wind speed or wind direction change rapidly, the contractor's burning operation may be

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

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

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

14. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way, except in designated sensitive areas. The clearing or reclearing contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

15. Noise Control - The contractor shall take steps to avoid the creation of excessive sound levels for employees, the public, or the site and adjacent property owners. Concentration of individual noisy pieces as well as the hours and locations of operation should be considered.

16. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers. The equipment and mufflers shall be maintained at peak operating efficiency.

17. Sanitation - A designated representative of TVA or the clearing contractor shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

18. Refuse Disposal - The clearing or reclearing contractor shall be responsible for daily cleanup and proper labeling, storage, and disposal of all refuse and debris on the site produced by his operations and employees. Facilities that meet applicable regulations

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

19. Brush and Timber Disposal (Reclearing) - The reclearing contractor shall place felled tree boles in neat stacks at the edge of the right-of-way, with crossing breaks at least every 100 feet. Property owner requests shall be reviewed with the project manager or right-of-way specialist before accepting them. Lop and drop activities must be specified in the contract and on plan and profile drawings with verification with the right-of-way specialist before conducting such work. When tree trimming and chipping is necessary, disposal of the chips on the easement or other locations on the property must be with the consent of the property owner and the approval of the right-of-way specialist. No trees, branches, or chips shall remain in a surface water body or be placed at a location where washing into a surface water or groundwater source might occur.

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

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

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

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

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012).* Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

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

References

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

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Appendix B

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Line Construction

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Line Construction

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor shall plan, coordinate, and conduct operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting. This specification contains provisions that shall be considered in all TVA and contract construction operations. If the contractor fails to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all structure and conductor pulling sites, protective measures to prevent erosion will be taken immediately upon the end of each step in a construction sequence, and those protective measures will be inspected and maintained throughout the construction and right-of-way rehabilitation period.

2. Regulations - TVA and/or the assigned contractor shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.

3. Use Areas - TVA and/or the assigned contractor's use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).

4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission line. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements.

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

   Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the structure sites except around foundation holes; the water must be directed away from the site in as dispersed a manner as possible. At tower or

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

5. Sanitation - A designated TVA or contractor representative shall contact a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

6. Refuse Disposal - Designated TVA and/or contractor personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his operations and by his employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as waste. Contractors must meet similar provisions on any project contracted by TVA.

7. Landscape Preservation - TVA and its contractors shall exercise care to preserve the natural landscape in the entire construction area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.

8. Sensitive Areas Preservation - Certain areas on site and along the right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments. Contractors and TVA construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing or construction operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's right-of-way inspector or construction superintendent and Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

9. Water Quality Control - TVA and contractor construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants,

debris, and other objectionable pollutants and wastes into flowing caves, sinkholes, streams, dry watercourses, lakes, ponds, and underground water sources.

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

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

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

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

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

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

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

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

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

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

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012).* Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

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

13. Air Quality Control - Construction crews shall take appropriate actions to minimize the amount of air pollution created by their construction operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.

14. Burning - Before conducting any open burning operations, the contractor shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner.

15. Dust and Mud Control - Construction activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

16. Vehicle Exhaust Emissions - TVA and/or the contractors shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show

excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

17. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the right-of-way except in designated sensitive areas. The Heavy Equipment Department within TVA or the construction contractor will properly maintain these vehicles with approved spill prevention controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Equipment shall not be temporarily stored in stream floodplains, whether overnight or on weekends or holidays.

18. Smoke and Odors - TVA and/or the contractors shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor shall not burn refuse such as trash, rags, tires, plastics, or other debris.

19. Noise Control - TVA and/or the contractor shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.

20. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction*. TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.

21. Damages - The movement of construction crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor will be responsible for erosion damage caused by his actions and especially for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the contract dealing with damages will apply.

References

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby

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Appendix C

Tennessee Valley Authority Transmission Construction Guidelines Near Streams

Tennessee Valley Authority Transmission Construction Guidelines Near Streams

Even the most carefully designed transmission line project eventually will affect one or more creeks, rivers, or other type of water body. These streams and other water areas are protected by state and federal law, generally support some amount of fishing and recreation, and, occasionally, are homes for important and/or endangered species. These habitats occur in the stream and on strips of land along both sides (the streamside management zone [SMZ]) where disturbance of the water, land, or vegetation could have an adverse effect on the water or stream life. The following guidelines have been prepared to help Tennessee Valley Authority (TVA) Transmission Construction staff and their contractors avoid impacts to streams and stream life as they work in and near SMZs. These guidelines expand on information presented in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (Muncy 2012).

Three Levels of Protection

During the preconstruction review of a proposed transmission line, the TVA Environmental Biological Compliance staff will have studied each possible stream impact site and will have identified it as falling into one of three categories: (A) standard streamside management protection, (B) protection of important permanent streams, springs, and sinkholes, or (C) protection of unique habitats. These category designations are based on the variety of species and habitats that exist in the stream, as well as federal requirements to avoid harming certain species.

As early as possible after field surveys are completed by the TVA Biological Compliance Staff, any streams that have been designated as either Category B or C will be discussed with the TVA Environmental Energy Delivery staff. The purpose of these discussions will be to minimize the number of crossings and their impact on the important resources in the streams during design and construction. The category designation for each stream site will then be marked on the transmission line plan and profile sheets. Construction crews are required to protect streams and other identified water habitats using the following pertinent set(s) of guidelines:

(A) Standard Stream Protection

This is the standard (basic) level of protection for streams, springs, sinkholes, and the habitats around them. The purpose of the following guidelines is to minimize the amount and length of disturbance to the water bodies without causing adverse impacts on the construction work.

Guidelines:

1. All construction work around streams, springs, and sinkholes will be done using pertinent best management practices (BMPs) such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, “Structural Controls Standards and Specifications” (Muncy 2012).

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

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

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement as a result of clearing operations by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. Shorelines that have to be disturbed must be stabilized as soon as feasible.

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

This category will be used when there is one or more specific reason(s) why a permanent (always-flowing) stream, spring, or sinkhole requires protection beyond that provided by standard BMPs. Reasons for requiring this additional protection include high potential for occupancy by federally listed or significant state-listed species, federally designated critical habitat, or areas designated as special use classification (e.g., trout waters). The purpose of the following guidelines is to minimize the disturbance of the banks and water in the flowing stream(s) where this level of protection is required.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around streams will be done using pertinent BMPs, such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, “Structural Controls Standards and Specifications” (Muncy 2012).

2. All equipment crossings of streams must comply with appropriate state (and, at times, federal) permitting requirements. Crossings of drainage channels and intermittent streams must be done in ways that avoid erosion problems and long-term changes in water flow. Category B designations will be discussed with the TVA Environmental Energy Delivery staff as early as possible in the process, to allow time to discuss possible avoidance or minimization of impacts with design and construction.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams must be limited to those required to meet National

Electrical Safety Code and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.

4. Other vegetation near streams must be disturbed as little as possible during construction. Soil displacement by the actions of plowing, disking, blading, or other tillage or grading equipment will be minimized in SMZs. Shorelines that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

(C) Protection of Unique Habitats

This category will be used when, for one or more specific reasons, a temporary or permanent aquatic habitat requires special protection. This relatively uncommon level of protection will be appropriate and required when a unique habitat requiring special protection is present (for example, the spawning area of a rare species), the stream is known to be occupied by a federally listed or significant state-listed species, or when required as a special condition resulting from consultation with the United States Fish and Wildlife Service to avoid project effects on a listed species or designated critical habitat. The purpose of the following guidelines is to avoid or minimize any disturbance of the unique aquatic habitat.

Guidelines:

1. Except as modified by Guidelines 2-4 below, all construction work around the unique habitat will be done using pertinent BMPs, such as those described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities,* especially Chapter 5, "Structural Controls Standards and Specifications" (Muncy 2012).

2. Category C designations would be discussed with the TVA Environmental Energy Delivery staff as early as possible following field surveys to allow time to discuss possible avoidance or minimization of impacts with design and construction. Environmental Energy Delivery staff would discuss construction activities to take place in the SMZ with the Environmental Biological Compliance staff. On-site planning sessions would be conducted as needed. All crossings of streams also must comply with appropriate state (and, at times, federal) permitting requirements.

3. Cutting of trees within SMZs must be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., a feller-buncher) that would result in minimal soil disturbance and damage to low-lying vegetation. The method will be selected based on site-specific conditions and topography to minimize soil disturbance and impacts to the SMZ and surrounding area. Cutting of trees near permanent streams should be limited to those required to meet National Electrical Safety Code, Federal Energy Regulatory Commission standards, and danger tree requirements. Stumps can be cut close to ground level, but must not be removed or uprooted.

4. Other vegetation near the unique habitat must be disturbed as little as possible during construction. Soil disturbance by plowing, disking, blading, or grading must be kept at a minimum. Areas that have to be disturbed must be stabilized as soon as possible and revegetated as soon as feasible.

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

Maintenance

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

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Appendix D

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Substation or Communications Construction

Tennessee Valley Authority Environmental Quality Protection Specifications for Transmission Substation or Communications Construction

1. General – Tennessee Valley Authority (TVA) and/or the assigned contractor and subcontractors shall plan, coordinate, and conduct his or her operations in a manner that protects the quality of the environment and complies with TVA's environmental expectations discussed in the preconstruction meeting (including clearing and grading or reclearing and removal or dismantling). This specification contains provisions that shall be considered in all TVA and contract construction, dismantling, or forensic operations. If the contractor and his or her subcontractors fail to operate within the intent of these requirements, TVA will direct changes to operating procedures. Continued violation will result in a work suspension until correction or remedial action is taken by the contractor. Penalties and contract termination will be used as appropriate. The costs of complying with the Environmental Quality Protection Specifications are incidental to the contract work, and no additional compensation will be allowed. At all site perimeters, structure, foundation, conduit, grounding, fence, drainage ways, etc., appropriate protective measures to prevent erosion or release of contaminants will be taken immediately upon the end of each step in a construction, dismantling, or forensic sequence, and those protective measures will be inspected and maintained throughout the construction and site stabilization and rehabilitation period.

2. Regulations - TVA and/or the assigned contractor and subcontractor(s) shall comply with all applicable federal, state, and local environmental and antipollution laws, regulations, and ordinances related to environmental protection and prevention, control, and abatement of all forms of pollution.

3. Use Areas - TVA and/or the assigned contractor and/or subcontractor(s) use areas include but are not limited to site office, shop, maintenance, parking, storage, staging, assembly areas, utility services, and access roads to the use areas. The construction contractor and subcontractor(s) shall submit plans and drawings for their location and development to the TVA engineer and project manager for approval. Secondary containment will be provided for fuel and petroleum product storage pursuant to 29CFR1910.106(D)(6)(iii)(OSHA).

4. Equipment - All major equipment and proposed methods of operation shall be subject to the approval of TVA. The use or operation of heavy equipment in areas outside the right-of-way, access routes, site, or structure, pole, or tower sites will not be permitted without permission of the TVA inspector or field engineer. Heavy equipment use on steep slopes (greater than 20 percent) and in wet areas will be held to the minimum necessary to construct the transmission or communication facility. Steps will be taken to limit ground disturbance caused by heavy equipment usage, and erosion and sediment controls will be instituted on disturbed areas in accordance with state requirements and best management practices (BMPs).

   No subsurface ground-disturbing equipment or stump-removal equipment will be used by construction forces except on access roads or at the actual site, structure, pole, or tower sites, where only footing locations and controlled runoff diversions shall be created that disturb the soil. All other areas of ground cover or in-place stumps and roots shall remain in place. (Note: Tracked vehicles disturb surface layer of the ground

due to size and function.) Some disking of the right-of-way, access, and site(s) may occur for proper seedbed preparation.

Unless ponding previously occurred (i.e., existing low-lying areas), water should not be allowed to pond on the site or around structures except around foundation holes; the water must be directed away from the site in as dispersed a manner as possible. At tower or structure sites, some means of upslope interruption of potential overland flow and diversion around the footings should be provided as the first step in construction-site preparation. If leveling is necessary, it must be implemented by means that provide for continuous gentle, controlled, overland flow or percolation. A good grass cover, straw, gravel, or other protection of the surface must be maintained. Steps taken to prevent increases in the moisture content of the in-situ soils will be beneficial both during construction and over the service life of any anchor, foundation, or its structure.

5. Sanitation - A designated TVA or contractor and/or subcontractor(s) representative shall contract a sanitary contractor who will provide sanitary chemical toilets convenient to all principal points of operation for every working party. The facilities shall comply with applicable federal, state, or local health laws and regulations. They shall not be located closer than 100 feet to any stream or tributary or to any wetland. The facilities shall be required to have proper servicing and maintenance, and the waste disposal contractor shall verify in writing that the waste disposal will be in state-approved facilities. Employees shall be notified of sanitation regulations and shall be required to use the toilet facilities.

6. Refuse Disposal - Designated TVA and/or contractor and subcontractor(s) personnel shall be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced by his or her operations and by his or her employees. Suitable refuse collecting facilities will be required. Only state-approved disposal areas shall be used. Disposal containers such as dumpsters or roll-off containers shall be obtained from a proper waste disposal contractor. Solid, special, construction/demolition, and hazardous wastes as well as scrap are part of the potential refuse generated and must be properly managed with emphasis on reuse, recycle, or possible give away, as appropriate, before they are handled as wastes. Records of the amounts generated shall be provided to the site's or project's designated environmental specialist. Contractor(s) and subcontractor(s) must meet similar provisions on any project contracted by TVA. Final debris, refuse, product, and material removal is the responsibility of the contractor unless special written agreement is made with the ultimate TVA owner of the site.

7. Landscape Preservation - TVA and its contractor(s) and subcontractor(s) shall exercise care to preserve the natural landscape in the entire construction, dismantling, or forensic area as well as use areas, in or outside the right-of-way, and on or adjacent to access roads. Construction operations shall be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural vegetation and surroundings in the vicinity of the work.

8. Sensitive Areas Preservation - Certain areas on site and along the access and/or right-of-way may be designated by the specifications or the TVA engineer as environmentally sensitive. These areas include but are not limited to areas classified as erodible, geologically sensitive, scenic, historical and archaeological, fish and wildlife refuges, endangered species' habitat, water supply watersheds, and public recreational areas such as parks and monuments. Contractors, their subcontractor(s), and TVA

construction crews shall take all necessary actions to avoid adverse impacts to these sensitive areas and their adjacent buffer zones. These actions may include suspension of work or change of operations during periods of rain or heavy public use; hours may be restricted or concentrations of noisy equipment may have to be dispersed. If prehistoric or historic artifacts or features are encountered during clearing, grading, borrow, fill, construction, dismantling, or forensic operations, the operations shall immediately cease for at least 100 feet in each direction, and TVA's construction superintendent, project manager, or area environmental program administrator and TVA Cultural Resources Program shall be notified. The site shall be left as found until a significance determination is made. Work may continue elsewhere beyond the 100-foot perimeter.

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

   The clearing contractor erected erosion and/or sedimentation control shall be maintained and (when TVA or contract construction personnel are unable) the construction crew(s) shall maintain BMPs such as silt fences on steep slopes and adjacent to any stream, wetland, or other water body. Additional BMPs may be required for areas of disturbance created by construction activities and at sequential steps of construction at the same location on site. BMPs will be inspected by the TVA field engineer or other designated TVA or contractor and/or subcontractor(s) personnel routinely and during periods of high runoff, and any necessary repairs will be made as soon as practicable. BMP inspections and any required sampling will be conducted in accordance with permit requirements. Records of all inspections and sampling results will be maintained on site, and copies of inspection forms and sampling results will be forwarded to the TVA project manager or supporting environmental specialist.

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

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

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

    On rights-of-way, mechanized equipment shall not be operated in flowing or standing water bodies except when approved and, then, only to construct crossings or to perform

required construction under direct guidance of TVA. Construction of stream fords or other crossings will only be permitted at approved locations and to current TVA construction access road standards. Material shall not be deposited in watercourses, their adjacent wetlands, or within stream bank areas where it could be washed away by high stream flows. Appropriate U.S. Army Corps of Engineers' and state permits shall be obtained.

Mechanized equipment shall not be operated in flowing or standing water on substation, switching station, or telecommunication sites.

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

11. Floodplain Evaluation - During the planning and design phase of the substation or communications facility, floodplain information should be obtained to avoid locating flood-damageable facilities in the 100-year floodplain. If the preferred site is located within a floodplain area, alternative sites must be evaluated and documentation prepared to support a determination of "no practicable alternative" to siting in the floodplain. In addition, steps taken to minimize adverse floodplain impacts should also be documented.

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

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

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

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

    C. All disturbed areas will initially be seeded with a temporary ground cover such as winter wheat, rye, or millet, depending on the season. Perennials may also be planted during initial seeding if proper growing conditions exist. Final restoration and final seeding will be performed as line construction is completed. Final seeding will consist of permanent perennial grasses such as those outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012).* Exceptions would include those areas designated as native grass planting areas. Initial and final restoration will be performed by the clearing contractor.

D. Rehabilitation species shall use species designated by federal guidance that are low–maintenance, native species appropriate for the site conditions that prevail at that location.

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

F. The site must be protected from species designated by the federal Invasive Species Council and must not be the source of species that can be transported to other locations via equipment contaminated with viable materials; thus, the equipment must be inspected, and any such species' material found must be removed and destroyed prior to transport to another location.

14. Air Quality Control - Construction, dismantling, and/or forensic crews shall take appropriate actions to minimize the amount of air pollution created by their operations. All operations must be conducted in a manner that avoids creating a nuisance and prevents damage to lands, crops, dwellings, or persons.

15. Burning - Before conducting any open burning operations, the contractor and subcontractor(s) shall obtain permits or provide notifications as required to state forestry offices and/or local fire departments. Burning operations must comply with the requirements of state and local air pollution control and fire authorities and will only be allowed in approved locations and during appropriate hours and weather conditions. If weather conditions such as wind direction or speed change rapidly, the contractor's burning operations may be temporarily stopped by the TVA field engineer. The debris for burning shall be piled and shall be kept as clean and as dry as possible, then burned in such a manner as to reduce smoke. No materials other than dry wood shall be open burned. The ash and debris shall be buried away from streams or other water sources and shall be in areas coordinated with the property owner on rights-of-way or project manager for TVA sites.

16. RENOVATION OR DEMOLITION DEBRIS MAY NOT BE BURNED.

17. Dust and Mud Control - Construction, dismantling, or forensic activities shall be conducted to minimize the creation of dust. This may require limitations as to types of equipment, allowable speeds, and routes utilized. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used subject to TVA's approval. On new construction sites and easements, the last 100 feet before an access road approaches a county road or highway shall be graveled to prevent transfer of mud onto the public road.

18. Vehicle Exhaust Emissions - TVA and/or the contractor(s) and subcontractor(s) shall maintain and operate equipment to limit vehicle exhaust emissions. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

19. Vehicle Servicing - Routine maintenance of personal vehicles will not be performed on the right-of-way or access route to the site. However, if emergency or "have to" situations arise, minimal/temporary maintenance to personal vehicles will occur in order

to mobilize the vehicle to an off-site maintenance shop. Heavy equipment will be serviced on the site except adjacent to or in designated sensitive areas. The Heavy Equipment Department within TVA or the construction, dismantling, or forensic contractor will properly maintain these vehicles with approved spill protection controls and countermeasures. If emergency maintenance in a sensitive or questionable area arises, the area environmental coordinator or construction environmental engineer will be consulted. All wastes and used oils will be properly recovered, handled, and disposed/recycled. Records of amounts generated shall be provided to TVA. Equipment shall not be temporarily stored in stream floodplains whether overnight or on weekends or holidays.

20. Smoke and Odors - TVA and/or the contractor(s) and subcontractor(s) shall properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The contractor and subcontractor(s) shall not burn refuse such as trash, rags, tires, plastics, or other debris.

21. Noise Control - TVA and/or the contractor and subcontractor(s) shall take measures to avoid the creation of noise levels that are considered nuisances, safety, or health hazards. Critical areas including but not limited to residential areas, parks, public use areas, and some ranching operations will require special considerations. TVA's criteria for determining corrective measures shall be determined by comparing the noise level of the construction, dismantling, or forensic operation to the background noise levels. In addition, especially noisy equipment such as helicopters, pile drivers, air hammers, chippers, chain saws, or areas for machine shops, staging, assembly, or blasting may require corrective actions when required by TVA.

22. Noise Suppression - All internal combustion engines shall be properly equipped with mufflers as required by the Department of Labor's *Safety and Health Regulations for Construction.* TVA may require spark arresters in addition to mufflers on some engines. Air compressors and other noisy equipment may require sound-reducing enclosures in some circumstances.

23. Damages - The movement of construction, dismantling, or forensic crews and equipment shall be conducted in a manner that causes as little intrusion and damage as possible to crops, orchards, woods, wetlands, and other property features and vegetation. The contractor and subcontractor(s) will be responsible for erosion damage caused by his or her actions and employees and, especially, for creating conditions that would threaten the stability of the right-of-way or site soil, the structures, or access to either. When property owners prefer the correction of ground cover condition or soil and subsoil problems themselves, the section of the project to be handled shall be documented with an implementation schedule and a property owner signature obtained.

24. Final Site Cleanup and Inspection - The contractor's designated person shall ensure that all construction, dismantling, or forensic-related debris, products, materials, and wastes are properly handled, labeled as required, and removed from the site. Upon completion of those activities, that person and a TVA-designated person shall walk down the site and complete an approval inspection.

References

Muncy, J. A. 2012. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities

(revised edition). Edited by Abigail Bowen, Jodie Branum, Corey Chandler, Adam Dattilo, Britta Dimick, Shea Gaither, Casey Henley, Todd Liskey, Joe Melton, Cherie Minghini, Paul Pearman, Kenton Smithson, Joe Turk, Emily Willard, Robby Wilson. Norris: TVA Technical Note TVA/LR/NRM 92/1. Retrieved from <http://www.tva.com/power/projects/bmp_manual_2012.pdf> (n.d.).

Revision January 2013

Appendix E

Tennessee Valley Authority Right-of-Way Vegetation Management Guidelines

Transmission Environmental Protection Procedures
Right-Of-Way Vegetation Management Guidelines

1.0 Overview

A. The Tennessee Valley Authority (TVA) must manage the vegetation on its rights-of-way and easements to ensure emergency maintenance access and routine access to structures, switches, conductors, and communications equipment. In addition, TVA must maintain adequate clearance, as specified by the National Electrical Safety Code, between conductors and tall growing vegetation and other objects. This requirement applies to vegetation within the right-of-way as well as to trees located off the right-of-way.

B. Each year TVA assesses the conditions of the vegetation on and along its rights-of-way. This is accomplished by aerial inspections, periodic field inspections, aerial photography, and information from TVA personnel, property owners and the general public. TVA utilizes this data to evaluate vegetation clearances and identifies vegetation on and off ROW that does, or could potentially pose a risk to reliability.

C. TVA transmission foresters develop a vegetation re-clearing plan that is specific to each line segment and is based on terrain conditions, species mix, growth, and density.

2.0 Right-of-Way Management Methods

A. TVA takes an integrated vegetation management (IVM) approach that is based on a carefully planned, multidimensional strategy developed in consultation with forestry and habitat experts. Integrated vegetation management aims to improve safety and prevent power outages by creating healthy and self-sustaining ecosystems in ROWs while ensuring compliance with regulatory standards (NERC 2006). These ecosystems foster beneficial, attractive and low-maintenance habitat where tall trees won't grow and other, more benign forms of vegetation can thrive. Integrated vegetation management encourages early successional native habitats that pose less threat to power reliability yet offer safe havens for desirable plants and animals. By combining selective use of herbicides with physical removal, integrated vegetation management can more thoroughly eradicate problem vegetation and allow more compatible species to fill in, making it harder for tall-growing trees to reestablish.

B. TVA uses a variety of herbicides specific to the species present with a variety of possible application techniques. Herbicides are selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers. Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the United States Environmental Protection Agency (USEPA) are used.

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

and Safety Administration. For that reason, TVA utilizes low volume herbicide applications in these areas when feasible.

D. TVA does not encourage tree re-clearing by individual property owners because of the high hazard potential of hand clearing, possible interruptions of the line, and electrical safety considerations for untrained personnel that might do the work.

E. Mechanical mowers not only cut the tall saplings and seedlings on the right-of-way, they also shatter the stump and the supporting near surface root crown. The tendency of resistant species is to re-sprout from the root crown and shattered stumps can produce a multi-stem dense stand in the immediate area. Repeated use of mowers on short cycle re-clearing with many original stumps re-growing in the above manner can create a single species thicket or monoculture. With the original large root system and multiple stems, the resistant species can produce re-growth at the rate of 5-10 feet in a year. In years with high rainfall, the growth can reach 12-15 feet in a single year. These dense, monoculture stands can become nearly impenetrable for even large tractors. Such stands have low diversity, little wildlife food or nesting potential, and become a property owner concern. Selective herbicide application may be used to control monoculture stands.

3.0 Herbicide Program

A. TVA has worked with universities (such as Mississippi State University, University of Tennessee, Purdue University and others), chemical manufacturers, other utilities, U.S. Department of Transportation, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) personnel to explore options for vegetation control. The results have been strong recommendations to use species-specific, low volume herbicide applications in more situations. Research, demonstrations, and other right-of-way programs show a definite improvement of rights-of-way treated with selective low-volume applications of new herbicides using a variety of application techniques and timing. Table 1 below identifies herbicides currently used on TVA rights-of-way. Table 2 identifies pre-emergent herbicides currently being used on bare ground areas on TVA rights-of-way and in substations. Table 3 identifies TGRs that may be used on tall trees that have special circumstances that require trimming on a regular cycle, e.g., restrictions on complete removal. The rates of application utilized are those listed on the U.S. Environmental Protection Agency (USEPA) approved label and consistent with utility standard practice throughout the Southeast.

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

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

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

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

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

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

B. The herbicides listed in Table 1 and 2 and TGRs listed in Table 3 have been evaluated in extensive studies in support of registration applications and label requirements. Many have been reviewed in the USFS vegetation management environmental impact statements (EISs), and those evaluations are incorporated here by reference (USFS 1989a, 1989b, 2002a, and

2002b). Electronic copies can be accessed at https://cdxnodengn.epa.gov/cdx-enepa-public/action/eis/search. The result of these reviews has been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low environmental toxicity when applied by trained applicators following the label and registration procedures, including prescribed measures, such as buffer zones, to protect threatened and endangered species.

C. Low volume herbicide applications are recommended since research demonstrates much wider plant diversity after such applications. There is better ground erosion protection and more wildlife food plants and cover plants develop. In most situations there is increased development of wild flowering plants and shrubs. In conjunction with herbicides, the diversity and density of low-growing plants provide control of tall-growing species through competition.

D. Herbicides are used in place of rotary mowing in order to avoid damage to nesting and tunneling wildlife. This method retains ground cover year around with a better mix of food species and associated high-protein insect populations for birds in the right seasons. Most also report less damage to soils (even when compared with rubber-tired equipment).

E. Best Management Practices (BMPs) governing application of herbicides are contained within *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities* (Muncy 2012) which is incorporated by reference. Herbicides can be liquid, granular, or powder and can be applied aerially or by ground equipment and may be selectively applied or broadcast, depending on the site requirements, species present, and condition of the vegetation. Water quality considerations include measures taken to keep herbicides from reaching streams whether by direct application or through runoff of or flooding by surface water. "Applicators" must be trained, licensed, and follow manufacturers' label instructions, USEPA guidelines, and respective state regulations and laws.

F. When herbicides are used, their potential adverse impacts are considered in selecting the compound, formulation, and application method. Herbicides that are designated "Restricted Use" by USEPA require application by or under the supervision of applicators certified by the respective state control board. Applications are done either by TVA or by contractors in accordance with the following guidelines identified in the TVA BMP manual (Muncy 2012):

    1. The sites to be treated are selected and application directed by the appropriate TVA official.
    2. A preflight walking or flying inspection is made within 72 hours prior to applying herbicides aerially. This inspection ensures that no land use changes have occurred, that sensitive areas are clearly identified to the pilot, and that buffer zones are maintained.
    3. Aerial application of liquid herbicides will normally not be made when surface wind speeds exceed 5 miles per hour, in areas of fog, or during periods of temperature inversion.
    4. Pellet application will normally not be made when the surface wind speeds exceed 10 miles per hour, or on frozen or water saturated soils.
    5. Liquid application is not performed when the temperature reaches 95 degrees Fahrenheit or above.
    6. Application during unstable, unpredictable, or changing weather patterns is avoided.

7. Equipment and techniques are used that are designed to ensure maximum control of the spray swath with minimum drift.
8. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and any label requirements. The use of aerial or broadcast application of herbicides is not allowed within a streamside management zone (SMZ) adjacent to perennial streams, ponds, and other water sources. Hand application of certain herbicides labeled for use within SMZs is used only selectively.
9. For aerial inspections, buffers and filter strips (200 feet minimum width) are maintained next to agricultural crops, gardens, farm animals, orchards, apiaries, horticultural crops, and other valuable vegetation.
10. Herbicides are not applied in the following areas or times: (a) in city, state, and national parks or forests or other special areas without written permission and/or required permits (b) off the right-of-way and (c) during rainy periods or during the 48- hour interval prior to rainfall predicted with a 20 percent or greater probability by local forecasters, when soil active herbicides are used.

G. TVA currently uses primarily low volume applications of foliar and basal applications, e.g., Accord (Glyphosate), Arsenal (Imazapyr), Clearstand (Imazapyr / Metsulfuron Methyl), Milestone VM (Aminopyralid) and Streamline (Aminocyclopyrachlor / Metsulfuron Methyl).

4.0 Benefits

A. Proper maintenance—including vegetation management—of ROW and its supporting facilities is crucial to ensuring the reliable transmission of affordable electrical power. Unmanaged and poorly maintained vegetation can cause electricity outages, wildfires, soil erosion, and water quality issues. Utility companies that adopt long-term IVM approaches often benefit from significant vegetation management cost savings, which can be reflected in customer rates.

B. ROW also provide important wildlife habitats. As wildlife habitats in the United States are lost to development, these ROW become increasingly important. The IVM approach can create natural, diverse, and sustaining ecosystems, such as a meadow transition habitat. A variety of wildlife species (including threatened and endangered species) consider these habitats home, such as butterflies, songbirds, small mammals, and deer. These habitats also encourage the growth of native plant species and can increase plant diversity.

C. Invasive and exotic species are often a problem on ROW, and, consequently, the surrounding land. IVM techniques (such as selective herbicide application) can minimize this problem, while ensuring native and endangered species are not affected.

5.0 References

Integrated Vegetation Management (IVM) on Rights-of-Way Fact Sheet. (2012, May) Retrieved from http://www.epa.gov/pestwise/htmlpublications/row_fact_sheet.html

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

U.S. Forest Service. 1989a. Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement, Volumes I and II. Southern Region Management Bulletin R8-MB-23, January 1989. Atlanta, Ga.: USDA Forest Service.

———. 1989b. Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement, Volumes I and II. Southern Region Management Bulletin R8-MB-38, July 1989. Atlanta, Ga.: USDA Forest Service.

———. 2002a. Vegetation Management in the Appalachian Mountains Final Environmental Impact Statement Supplement. Southern Region Management Bulletin R8-MB-97A, October 2002. Atlanta, Ga.: USDA Forest Service.

———. 2002b. Vegetation Management in the Coastal Plain/Piedmont Final Environmental Impact Statement Supplement. Southern Region Management Bulletin R8-MB-98A, October 2002. Atlanta, Ga.: USDA Forest Service.

Appendix F

Correspondence and supporting information

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
MEMPHIS ENVIRONMENTAL FIELD OFFICE
DIVISION OF WATER RESOURCES
8383 WOLF LAKE DRIVE
MEMPHIS, TN 38133

April 25, 2017

Mr. Peter Candelaria
Silicon Ranch Corporation
150 Third Ave., Ste. 2000
Nashville, TN 37201

Subject: **General Permit for Minor Alterations to Wetlands**
Aquatic Resource Alteration Permit (ARAP) NR1705.016
Silicon Ranch Millington, LLC
Millington, Shelby County, Tennessee

Dear Mr. Candelaria:

We have reviewed your application for the proposed impacts to ~0.086 acres of wetlands resulting from construction of solar farm. Pursuant to the *Tennessee Water Quality Control Act of 1977* (T.C.A. § 69-3-101 et seq.) and supporting regulations the Division of Water Resources is required to determine whether the activity described in the attached notice of coverage will violate applicable water quality standards. This permit may also serve as a federal §401 water quality certification (pursuant to 40 C.F.R. §121.2).

This activity is governed by the *General Permit for Minor Alterations to Wetlands*. The work must be accomplished in conformance with accepted plans and information submitted in support of application NR1705.016 and the limitations and conditions set forth in the *General Permit for Minor Alterations to Wetlands* (enclosed). It is the responsibility of the permittee to ensure that all contractors involved with this project have read and understand the permit conditions before the project begins.

Please note that this alteration shall not cause measurable degradation to resource values and classified uses of hydrologically connected wetlands or other waters of the state. Adjacent wetlands or streams determined likely to be measurably degraded by hydrologic alteration or partial fill must be included in the cumulative impact calculation. In addition, adequate erosion controls must be installed prior to construction and maintained during construction of the project. All disturbed areas must be re-vegetated or otherwise stabilized upon completion of construction.

Annual Maintenance and Coverage Termination

Permittees will be assessed an annual maintenance fee of $350 for coverages that exceed one year. Please note that this maintenance fee does not grant the right to extend coverage past the expiration date of the General Permit itself.

Permittees may terminate coverage prior to the expiration date by submitting a completed notice of termination form (NOT), which is available on the division's webpage at http://tdec.tn.gov/etdec/DownloadFile.aspx?row_id=CN-1450. A complete NOT should include photodocumentation of the finished project area. The division will notify the permittee that either the

NOT was received and accepted, or that the permit coverage is not eligible for termination (due to existing deficiencies) and has not been terminated.

We appreciate your attention to the terms and conditions of this general permit for aquatic resource alteration. If you have any questions, please contact Mr. Lew Hoffman at (901) 371-3019 or by e-mail at *Lew.Hoffman@tn.gov*.

Sincerely,

Joellyn Brazile
Environmental Program Manager

Encl: NOC and copy of general permit
CC: Memphis EFO Permit File
Mr. Thomas Blackwell, Project Manager, HDR

Under the Aquatic Resource Alteration

General Permit for Minor Alterations to Wetlands

Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville TN 37243

ARAP - NR1705.016

Under authority of the Tennessee Water Quality Control Act of 1977 (TWQCA, T.C.A. 69-3-101 et seq.) the Division of Water Resources has determined the activity described below would not violate applicable water quality standards.

This activity is governed by the *General Permit* for *Minor Alterations to Wetlands* issued pursuant to the TWQCA. The work must be accomplished in conformance with accepted plans, specifications, data and other information submitted in support of application NR1705.016 and the terms and conditions set forth in the above referenced general permit.

PERMITTEE:	Silicon Ranch Millington, LLC
AUTHORIZED WORK:	Impacts to ~0.086 acres of wetlands resulting from construction of solar farm
LOCATION:	North of Navy Road and West of Bethuel Road, Millington, TN, Shelby County
	Latitude: 35.351693 Longitude: -89.857721
WATERBODY NAME:	Big Creek tributary and wetlands

EFFECTIVE DATE: 25-APR-17 **EXPIRATION DATE**: 06-APR-20

This does not preclude requirements of other federal, state or local laws. In particular, work shall not commence until the applicant has received the federal §404 permit from the U. S. Army Corps of Engineers, a §26a permit from the Tennessee Valley Authority or authorization under a Tennessee NPDES Storm Water Construction Permit where necessary. This permit may also serve as a federal §401 water quality certification (pursuant to 33 U.S.C. §1341) since the planned activity was reviewed and the division has reasonable assurance that the activity will be conducted in a manner that will not violate applicable water quality standards (T.C.A. § 69-3-101 et seq. or of § § 301, 302, 303, 306 or 307 of *The Clean Water Act*).

The state of Tennessee may modify, suspend or revoke this authorization should the state determine that the activity results in more than an insignificant degradation of applicable water quality standards or violation of the TWQCA. Failure to comply with permit terms may result in penalties in accordance with T.C.A. §69-3-115.

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

October 31, 2017

Ms. Mary Jennings
Field Supervisor
U. S. Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Ms. Jennings:

TENNESSEE VALLEY AUTHORITY – SILICON RANCH MILLINGTON SOLAR PROJECT AND SHELBY-DRUMMONDS 161KV TRANSMISSION LINE TAP AND RIGHT-OF-WAY

The Tennessee Valley Authority (TVA) proposes to execute a Power Purchase Agreement (PPA) with SR Millington, LLC - the facility-specific entity affiliated with Silicon Ranch Corporation (SRC) - to purchase the electric power generated by a proposed solar photovoltaic (PV) facility near Millington, Shelby County, Tennessee (Millington solar Facility). In addition to entering into a PPA with SR Millington, TVA would also construct a 4.9-mile long 161-kilvolt (kV) transmission line connection to the solar facility. The proposed Millington Solar Facility would occupy approximately 390 acres of a 438-acre tract. The transmission line would have a 100-foot Right-of-Way (ROW) occupying approximately 60 acres. Approximately 96 acres of the 480-acre action area is forested habitat that would be removed in association with the proposed actions. Following construction and grading (at the solar facility), the action area would be seeded with grasses and forbs and maintained as early successional habitat. Tree clearing is proposed July-September. See attached TVA Technical Report and BWSC Millington Solar Farm Bat Survey Report for more detailed project description, figures, habitat assessment forms, and photos.

Review of the TVA Regional Natural Heritage database and the U.S. Fish and Wildlife Service IPaC website indicated four species listed as endangered, threatened, a candidate for listing, or proposed for listing under the Endangered Species Act occur in the project area, Shelby County, Tennessee, or within 10 miles of the project area. These species include two birds (interior least tern and piping plover) and two mammals (Indiana bat and northern long-eared bat) that have the potential to occur within Shelby County based on historic range, proximity to known occurrence records, biological characteristics and/or physiographic characteristics. In addition, the federally protected bald eagle has been reported in Shelby County, Tennessee. No designated critical habitat for any of these species is present within the project action area.

Field reviews were conducted on the solar facility site by BWSC and their subcontractors in November 2016. Additional surveys of the proposed transmission line ROW were conducted by TVA in August 2017. The reviews determined whether suitable habitat for federally listed

species occurs within the project action area. No habitat for the federally listed interior least tern or piping plover occur in the action area. TVA has determined that the proposed actions would have no effect on interior least tern and piping plover.

The closest known bald eagle nesting record is approximately 25 miles from the project action area. No bald eagle nests were observed during field reviews at the solar facility or along the proposed transmission line route. Bodies of water within the action area do not provide suitable foraging habitat for bald eagle. TVA has determined that the proposed actions would have no effect on bald eagle.

Phase 1 Habitat Assessments Surveys (2016 and 2017 Range-Wide Indiana Bat Summer Survey Guidelines) for Indiana bats and northern long-eared bats (NLEBs) were conducted along the proposed transmission line route by TVA biologists in August 2017 and in the proposed solar facility by BWSC and Jackson Group in August 2016. No caves were observed during field reviews. There are no known caves within 10 miles of the proposed actions. Three bunkers and a number of barns would be demolished in association with the proposed actions on the solar facility site. These structures were evaluated for habitat suitability during field reviews. Due to lack of access and egress points on the bunkers, BWSC and Jackson group determined that these structures do not provide suitable habitat for Indiana bat or NLEB. However, suitable summer roosting habitat may exist within some of the barns located on-site. Winter roosting habitat does not exist within the project area.

Foraging habitat for Indiana bat and NLEB exists over wetlands, streams, forested tree lines, and forest fragments within the proposed action areas. Best Management Practices would be used in and along all streams and wetlands potentially impacted by the proposed actions. Thus streams and wetlands would still be available for use by foraging bats following the proposed actions. Any impacts to wetlands that cannot be avoided would have regulatory requirements associated with the USACE Section 404 permitting program.

Suitable forested summer roosting habitat for Indiana bats and NLEBs was identified within the proposed solar facility area. The dominant canopy species were white oak, pin oak, and cottonwood. Only two snags suitable for these roosting bats were identified along the 4.9-mile transmission route. Dominate canopy species along the transmission line were hackberry, ash, red oak, and tulip poplar. In total, approximately 90 acres of forest would be removed for the construction of the solar facility and transmission line. All requested information is contained within the TVA Technical Report and the BWSC Millington Solar Farm Bat Survey Report (e.g., project description, methods, survey locations, maps, summary of results, photos, habitat assessments etc.).

Phase 2 Presence/Absence Surveys (mist-nets) were conducted on August 10, 2016 and August 11, 2016 by BWSC in cooperation with the Jackson Group on the solar facility property (2016 Range-Wide Indiana Bat Summer Survey Guidelines). Surveys were performed at two net site locations for nine net nights resulting in no captures of any bats during the entire survey duration. See BWSC Millington Solar Farm Bat Survey Report.

The closest known record of either bat species is a male Indiana bat that was reportedly collected from the Memphis area in 1968 (Graves and Harvey 1974) roughly 15-20 miles away. Although the Tennessee Bat Working Group maps indicate there are records of NLEB in Shelby County, the location of that record is unknown. Outside of Shelby County, the closest known Indiana bat records are maternity roosts in Holly Springs National Forest, Benton County, Mississippi, approximately 51.1 miles away. The closest known NLEB records outside of Shelby County are summer capture records from Hardin County, Tennessee, approximately 96 miles away.

Due to the presence of potentially suitable summer roosting habitat but the lack of bat captures within the project action area during Phase 2 surveys, as well as the lack of recent documentation of either species in this region, TVA has determined that the proposed actions my affect but are not likely to adversely affect the Indiana bat or the northern long-eared bat. TVA requests concurrence with these determinations and confirmation from your office that TVA's obligations regarding ESA compliance are fulfilled.

Should you have any questions or wish to discuss the project in more detail, please contact Liz Hamrick at 865-632-4011.

Sincerely,

John T. Baxter, Jr.
Manager
Biological Compliance

EBH:ABM
Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Tennessee ES Office
446 Neal Street
Cookeville, Tennessee 38501

November 2, 2017

John T. Baxter, Jr.
Manager
Endangered Species Act Compliance
Tennessee Valley Authority
400 W Summit Hill Dr.
Knoxville, Tennessee 37902

Subject: FWS# 2018-I-0063 & 2018-CPA-0075. Tennessee Valley Authority – Proposed Silicon Ranch Solar Project in Millington, Shelby County, Tennessee.

Dear Mr. Baxter:

Thank you for your correspondence dated October 27, 2017, regarding the Tennessee Valley Authority's (TVA) proposal to execute a Power Purchase Agreement (PPA) to purchase the electric power generated by a proposed solar photovoltaic facility in Millington, Shelby County, Tennessee. The proposed action would result in the construction and operation of the solar facility including a new on-site substation and occupy approximately 390 acres of a 438-acre tract. In addition to entering a PPA, the TVA would construct an approximately 4.9-mile long 161-kilovolt (Shelby-Drummonds) transmission line right-of-way (ROW), connecting to the solar facility. U.S. Fish and Wildlife Service (Service) personnel have reviewed the submitted information, and we offer the following comments.

Implementation of the proposal would require approximately 90 acres of tree removal within the defined action area. To establish presence or probable absence of the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*) within the action area, Barge, Waggoner, Sumner & Cannon, Inc. conducted a mist-netting survey in accordance with the 2016 Range-wide Indiana Bat Summer Survey Guidelines. This survey was conducted within the site of proposed solar facility. No bats were captured during survey efforts, indicating probable absence of federally protected bat species.

Additionally, TVA conducted a habitat suitability assessment for the area within the proposed location of the ROW. Results of this assessment identified two (2) snags that provide marginally suitable habitat for these species; however, removal of these structures would not result in a significant impact to protected forest-dwelling bat species. We recommend the two snags be removed between October 15 and March 31.

TVA has identified the Indiana bat and northern long-eared bat as federally threatened or endangered species that could occur within the action area. TVA has determined that the proposed action may affect, but is not likely to adversely affect the Indiana bat and northern long-eared bat. Based upon the results of the mist-netting survey and habitat assessment, the Service concurs with this determination. We note, however, that collection records available to the Service may not be all-inclusive. Our database is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the action that may affect listed species or critical habitat in a manner not previously considered, (2) the action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the action.

The project description indicates that upon completion of construction, the area would be reseeded with grasses and forbs and managed as early successional habitat. To address concerns regarding invasive exotic species, the Service recommends that native seed mixtures be used. Additionally, the Service recommends that native seed mixtures contain plant species that are beneficial to pollinators. Taller growing pollinator plant species should be planted around the periphery of the site and anywhere on the site where mowing will be restricted. Low growing/groundcover native species should be planted under the solar panels and between the rows of solar panels. Using a seed mixture that includes milkweed species is especially beneficial to pollinators.

Thank you for the opportunity to comment on the proposed action. If you have any questions regarding the information which we have provided, please contact Dustin Boles of my staff at 931/525-4984, or by email at *dustin_boles@fws.gov*.

Sincerely,

Mary E. Jennings

Mary E. Jennings
Field Supervisor

TECHNICAL REPORT:
HABITAT ASSESSMENT FOR INDIANA BAT (*MYOTIS SODALIS*) AND NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*)

TVA SHELBY-DRUMMONDS 161KV TRANSMISSION LINE TAP AND RIGHT-OF-WAY TO MILLINGTON SOLAR FACILITY

SHELBY COUNTY, TENNESSEE

PREPARED BY:
TENNESSEE VALLEY AUTHORITY
BIOLOGICAL COMPLIANCE/NATURAL RESOURCE COMPLIANCE PROGRAMS
Liz Hamrick

OCTOBER 27, 2017

Direct comments to:

John (Bo) T. Baxter
Endangered Species Act Compliance Officer
Tennessee Valley Authority
400 West Summit Hill Drive, WT-11C
Knoxville, Tennessee 37902
Phone: (865) 632-3360
Fax: (865) 632-4223
E-mail: jtbaxter@tva.gov

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1.0 EXECUTIVE SUMMARY

In order to meet the Tennessee Valley Authority's (TVA) renewable energy generating capacity goals and to meet the Navy's renewable energy goals, TVA proposes to build a new 161- kilovolt (kV) transmission line and associated 100 foot Right-of-Way (ROW) from an existing TVA substation to a proposed 69.6 Megawatt (MW) Millington Solar Facility in Shelby County, Tennessee.

Phase 1 Habitat Assessments Surveys (2017 Range-Wide Indiana Bat Summer Survey Guidelines, May 2017) were conducted along the proposed transmission line route in August 2017. Two trees offering potentially suitable summer roosting habitat for federally endangered Indiana bat (Myotis sodalis) and federally threatened northern long-eared bat (Myotis septentrionalis) were identified. Habitat surveys and presence/absence surveys for these two bat species on the proposed solar facility site were performed by Barge Waggoner Sumner & Cannon, Inc. and Jackson Group in August 2016 (See attached Millington solar Farm Bat Survey Report.pdf). Suitable summer roosting habitat was identified within some forest fragments of the proposed solar facility. No Indiana bats or northern long-eared bats were captured during mist net surveys.

A total of 96 acres of forested habitat has the potential to be removed by the proposed actions across the entire project action area (498 acres in total). The footprint of the ROW covers approximately 60 acres, only 10 percent of which is comprised of forest fragments (6 acres). Any suitable forested federally listed bat habitat identified would be removed between October 15 and March 31. The remaining forested habitat would be cleared July- September. The following Technical Report focuses on the proposed transmission line and ROW only.

2.0 DESCRIPTION OF PROPOSED PROJECT

In order to provide energy security to the Naval Support Activity (NSA) Mid-South facility in Shelby County, Tennessee and meet the Navy's renewable energy goals under their "1 Gigawatt Initiative", as well as to expand TVA's renewable energy generating capacity, TVA issued a Request for Proposal (RFP) and solicitation in October 2015 for the generation and delivery of renewable energy from a single PV energy provider. TVA proposes to execute a power purchase agreement (PPA) with SR Millington, LLC—the facility-specific entity affiliated with Silicon Ranch Corporation (SRC)—to purchase the electric power generated by a proposed solar photovoltaic (PV) facility near Millington, Shelby County, Tennessee. The proposed solar facility known as "Millington Solar Facility", would have direct current (DC) generating capacity of 68.5 megawatts (MW) with an alternating current (AC) output of 53 MW.

The proposed actions would result in the construction and operation of the proposed solar facility, including a new on-site substation and occupy approximately 390 acres of a 438-acre tract. Actions also include a new 12.47 kilovolt (kV) distribution line by SR Millington, LLC, as well as actions taken by TVA to connect the solar facility to the TVA transmission system. To connect the proposed solar facility to TVA's transmission system, TVA is proposing to build a new 4.9 mile 161-kV transmission line with a 100-foot ROW between TVA's existing Shelby 500kV substation and the proposed solar facility.

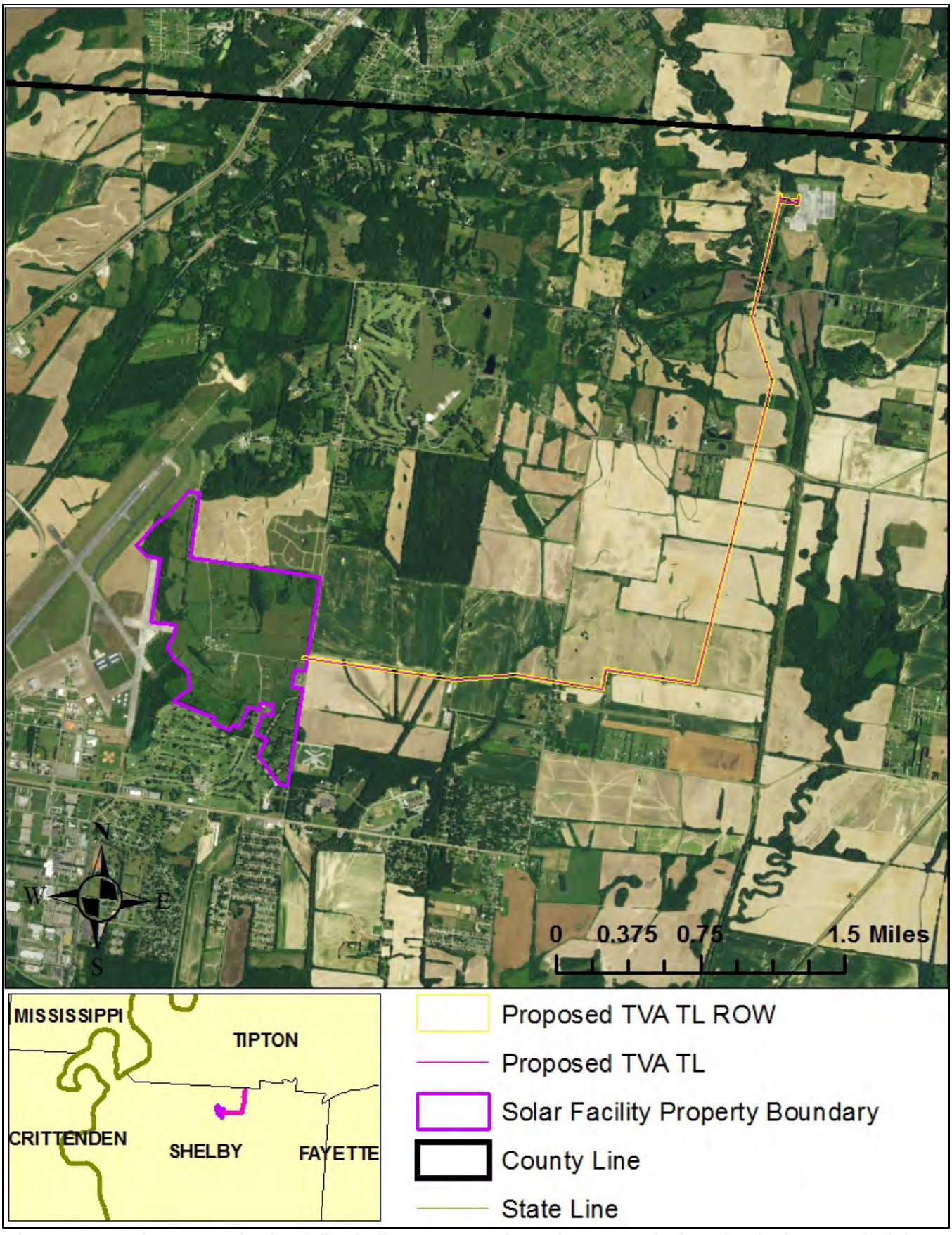


Figure 2-1. Project Footprint (Aerial), Shelby-Drummonds 161kV Transmission Line (TL) Tap and Right-of-Way (ROW) to Millington Solar Facility Shelby County, Tennessee.

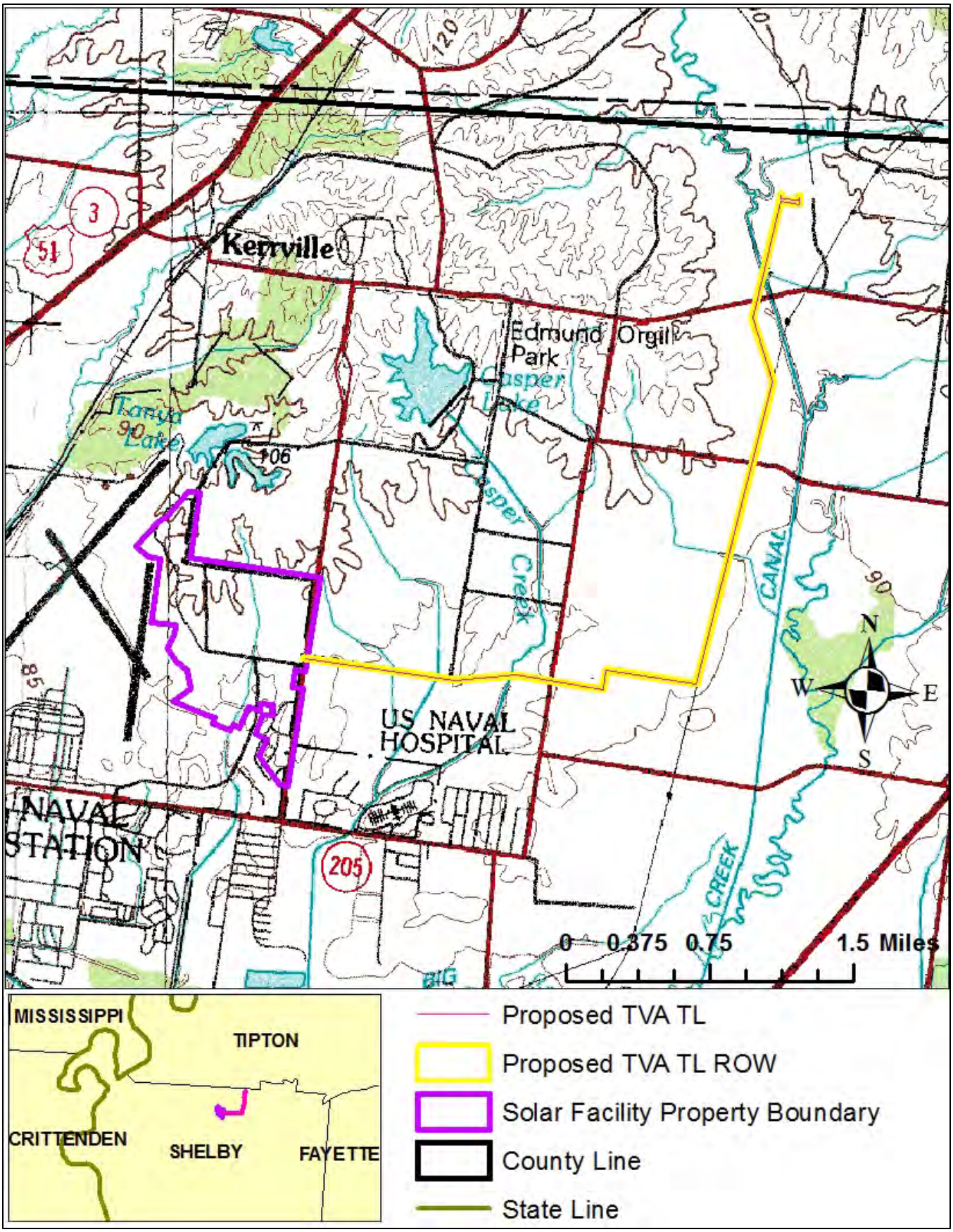


Figure 2-2. Project Footprint (Topographic), Shelby-Drummonds 161kV Transmission Line (TL) Tap and Right-of-Way (ROW) to Millington Solar Facility Shelby County, Tennessee.

3.0 HABITAT ASSESSMENT

Information provided in this Section is in accordance with guidelines for submission of habitat assessment as described in *2017 Range-wide Indiana Bat Summer Survey Guidelines* (U.S. Fish and Wildlife Service, May 2017, Appendix A, pages 10-13).

3.1. Methods

Terrestrial zoologists with TVA conducted a desktop review of the project area using aerial imagery to determine if there was a potential for suitable habitat for Indiana bat and northern long-eared bat (NLEB) to be present within the project area. A search was performed for the nearest documented records of both bat species and potential winter hibernacula. Based on this desktop review, it was determined that a habitat suitability assessment for these two bat species was warranted.

Terrestrial zoologists with TVA conducted habitat suitability assessments for Indiana bat and NLEB within the proposed ROW action area on August 2, 2017. See Section 2.0 of this Technical Report and Figures 2-1 through 2-2 for a description of the proposed project and location.

Forest habitat assessments focused on presence of dead trees greater than or equal to three (3) inches in diameter for NLEB, and five (5) inches in diameter for Indiana bat, with exfoliating bark, cavities, and solar exposure. Potentially suitable live trees with exfoliating bark and habitat suitable for foraging and commuting activities also were noted.

3.2. Results

A search of the TVA Regional Natural Heritage database did not result in any records of Indiana bat or NLEB in Shelby County. The Tennessee Bat Working Group reports records of both species in Shelby County (http://www.tnbwg.org/). A male Indiana bat was reportedly collected from the Memphis area in 1968 (Graves and Harvey 1974) roughly 15-20 miles away. The location of the NLEB record is unknown. Outside of Shelby County, the closest known Indiana bat records are maternity roosts in Holly Springs National Forest, Benton County, Mississippi, approximately 51.1 miles away. The closest known NLEB records outside of Shelby County are summer capture records from Hardin County, Tennessee, approximately 96 miles away (Figure 3-1). No caves have been documented within a three-mile radius of the proposed ROW. No winter roosting habitat was observed within the proposed ROW during field review.

Foraging habitat for both Indiana and northern long-eared bat exists within the proposed ROW over streams, wetlands, and forest fragments as well as within forest canopies and along forest edges. Big Creek, Casper Creek, unnamed streams and wetlands within the project footprint also provide suitable drinking water for bats. Field review of the proposed ROW identified only two snags that may offer suitable summer roosting habitat for Indiana bat and northern long-eared bat. No additional summer roosting structures occur within the proposed ROW (Figure 3-2).

The first identified suitable snag (Bat Tree 1) occurs in a forest fragment surrounded by agricultural fields. The snag was approximately 17 inches in diameter and 35 feet tall, had no exfoliating bark, but possessed several cavities and crevices. The forest fragment containing this snag is a mixed hardwood stand with a moderately closed canopy (approximately 41-60% closure). The second snag is a willow species approximately 10 inches in diameter and 20 feet tall that occurs within a narrow strip of forest along a stream bank between two agricultural fields. The forested strip was predominantly comprised of sycamores, willows, and cottonwoods and had a moderate canopy closure as well (approximately 41-60% closure). These snags not clustered together and were instead found at opposite ends of the proposed ROW. Both trees occur on the extreme edge of the proposed ROW. Removal of one or both of these trees may not be necessary once construction begins (Figures 3-3 and 3-4).

The landscape directly surrounding the disposal area footprint is primarily agricultural lands (corn and soy fields) and rural homes. Several creeks lined with forest fragments, a Naval base (including airstrips, industrial buildings, and residential homes), roads and a TVA substation are also present within 1 mile of the proposed solar facility and transmission line (Figure 3-5). Land use and remaining habitat within a 5-mile radius is similar to that within a 1-mile radius, with more urban development along major roads and larger blocks of forest along drainage canals and the Loosahatchie River (80% agriculture 8% forest, 8% urban development, and 2% open water; Figure 3-3).

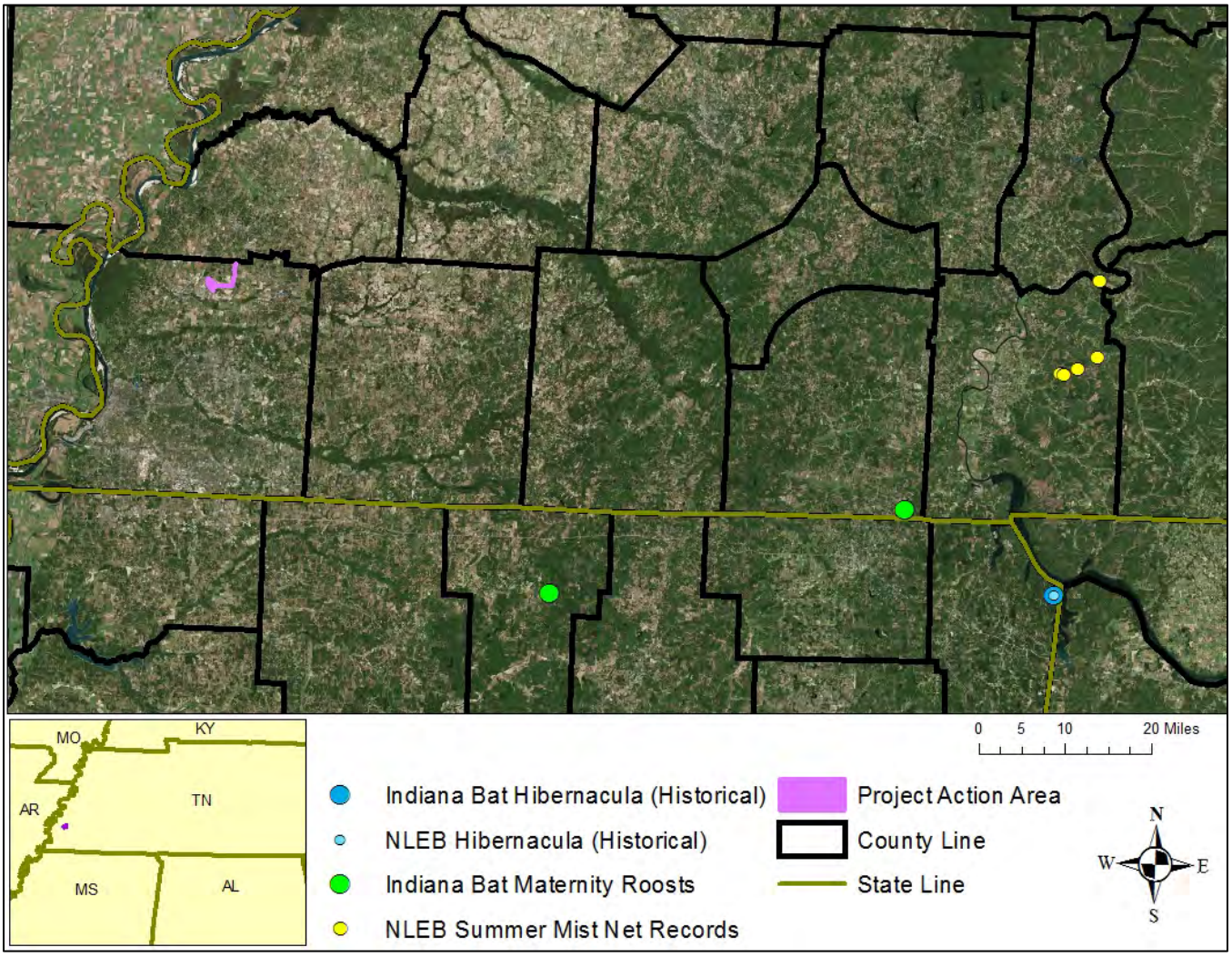


Figure 3-1. Known Occurrences of Indiana Bat and Northern long-eared bat (NLEB) in the Surrounding Project Area.

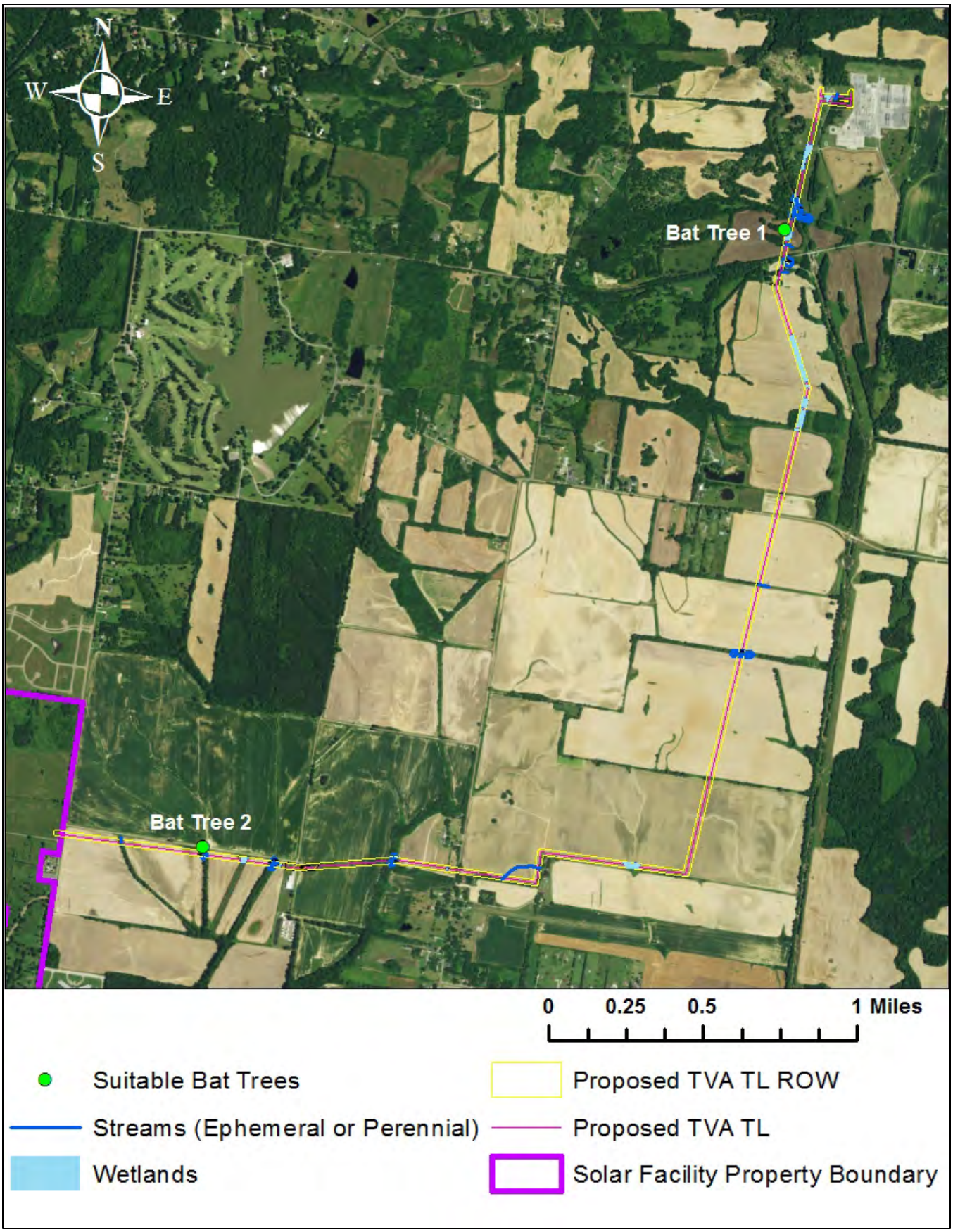


Figure 3-2. Natural Resources Identified during Field Surveys along the proposed Shelby-Drummonds 161kV Transmission Line (TL) Tap and Right-of-Way (ROW) Route Shelby County, Tennessee.

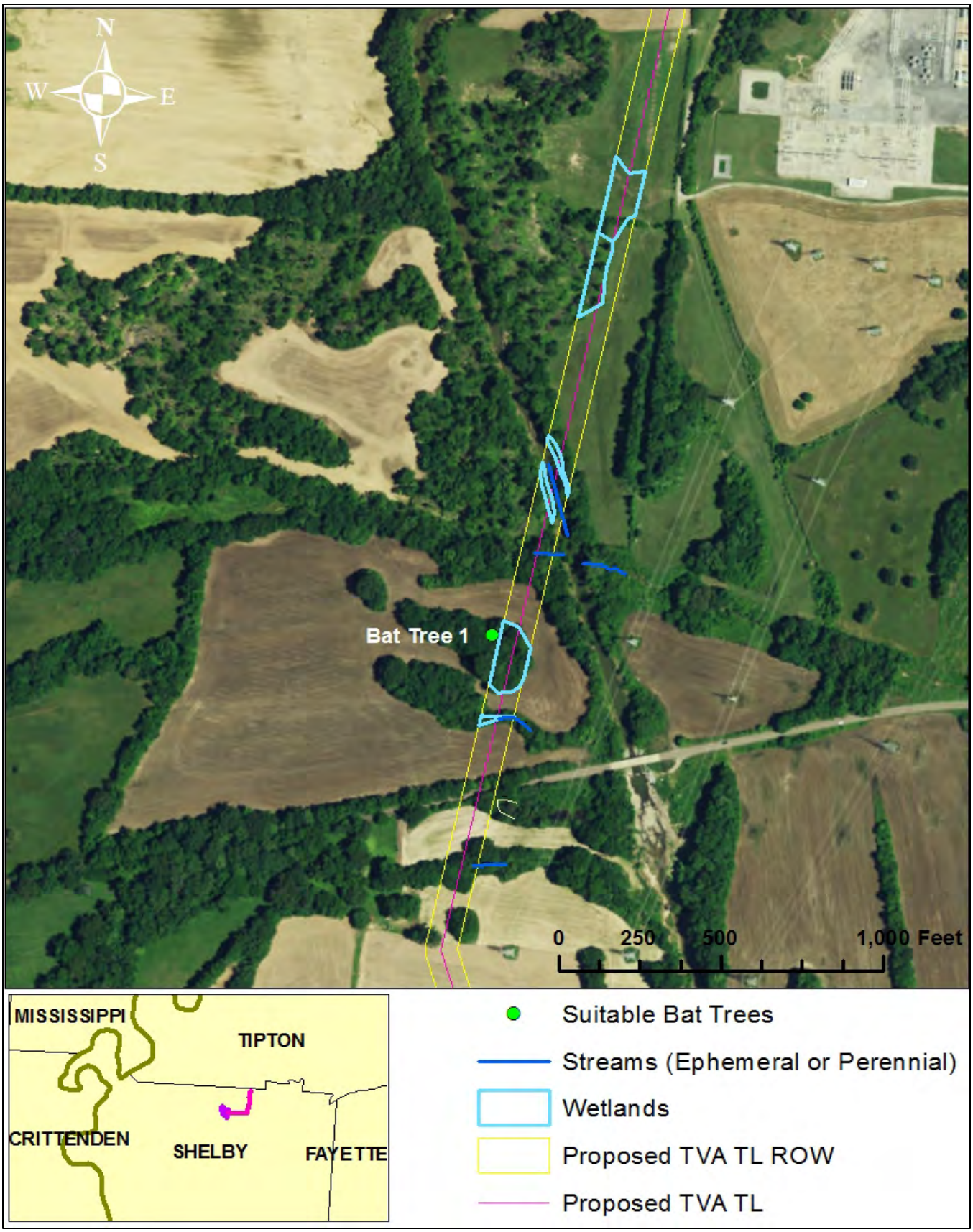


Figure 3-3. Suitable Summer Roosting Bat Tree 1 Identified during Field Surveys along the proposed Shelby-Drummonds 161kV Transmission Line (TL) Tap and Right-of-Way (ROW) Route Shelby County, Tennessee.

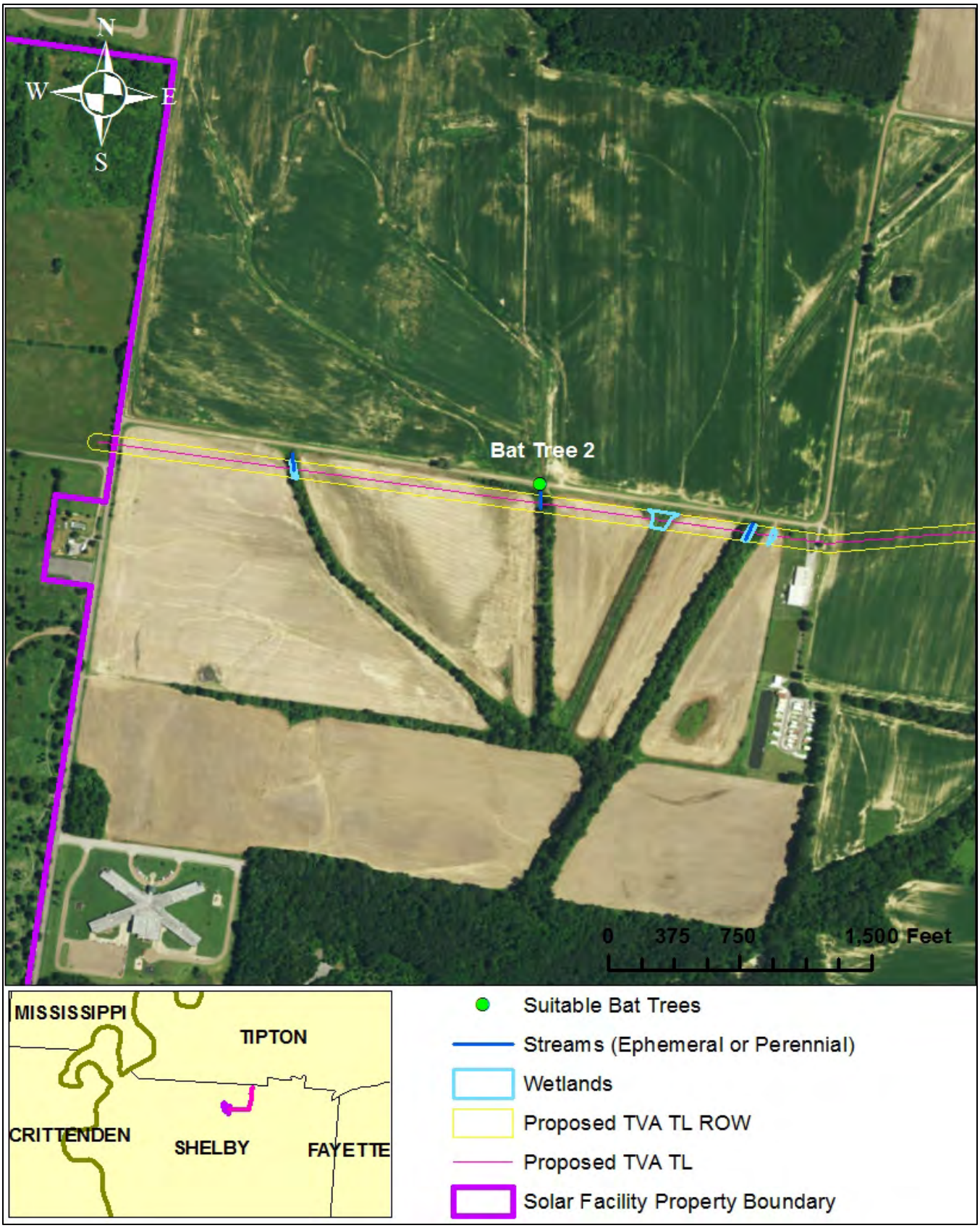


Figure 3-4. Suitable Summer Roosting Bat Tree 2 Identified during Field Surveys along the proposed Shelby-Drummonds 161kV Transmission Line (TL) Tap and Right-of-Way (ROW) Route Shelby County, Tennessee.

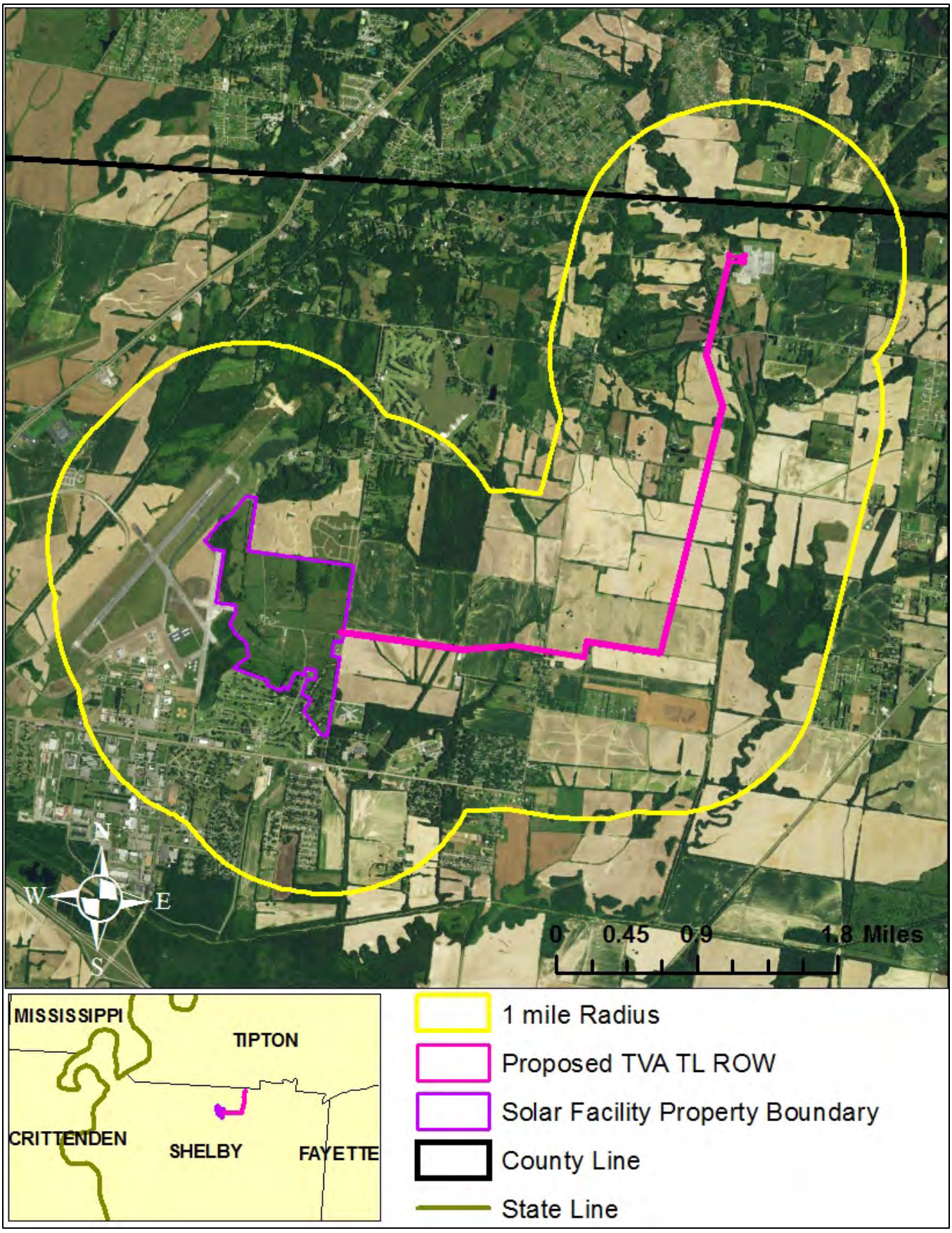


Figure 3-5. Habitat within 1 mile of Proposed Solar Facility and Transmission Line (TL) Right-of-Way (ROW), Shelby County, Tennessee.

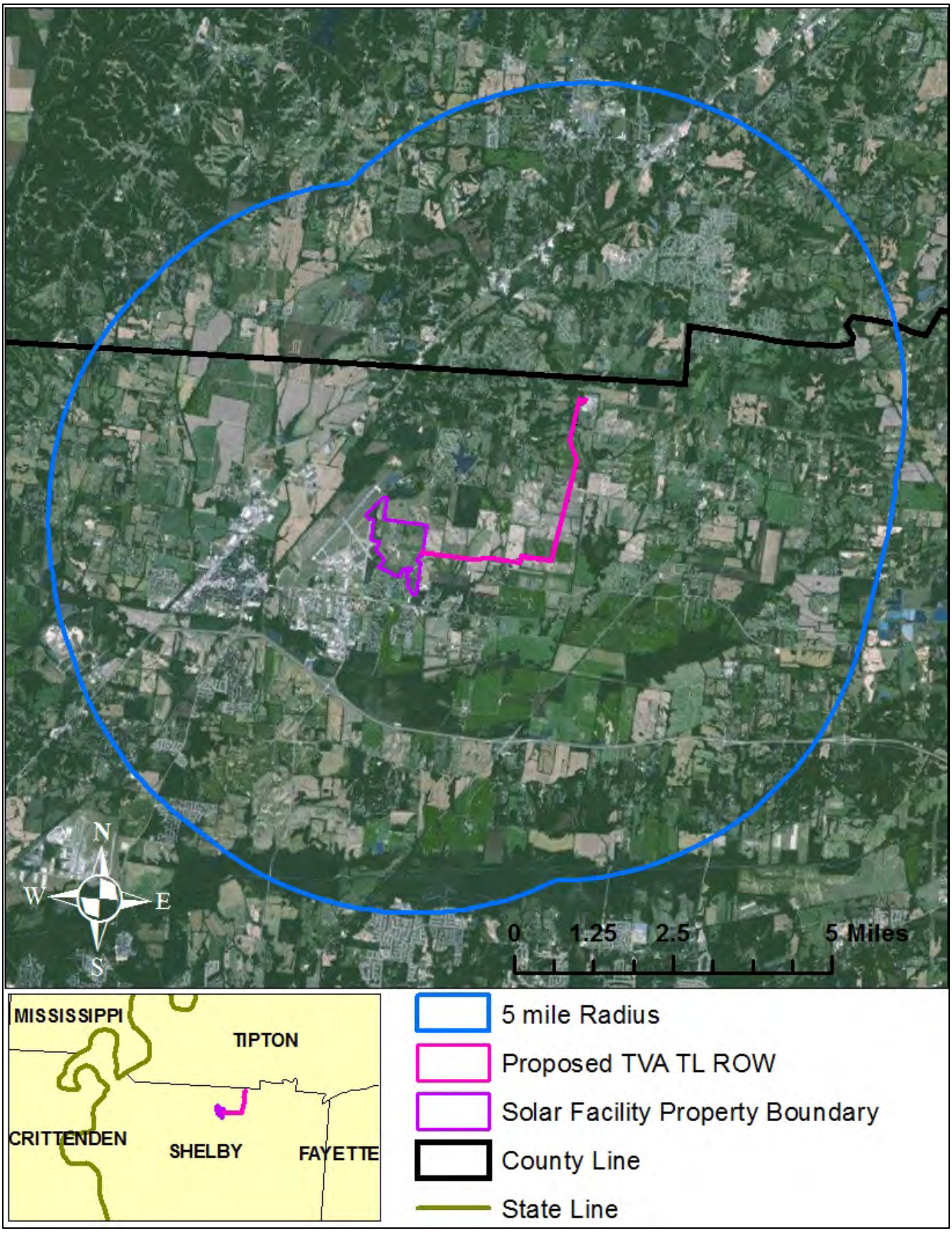


Figure 3-6. Habitat within 5 miles of the Proposed Solar Facility and Transmission Line (TL) Right-of-Way (ROW), Shelby County, Tennessee.

4.0 CONCLUSIONS

Review of the proposed Shelby-Drummond TL Tap and ROW to the Millington Solar Facility determined that only two snags that potentially offer suitable summer roosting habitat for Indiana bat and northern long-eared bat are present within the entire 60 acre proposed project footprint. The closest extant Indiana bat record is approximately 51 miles away while the closest northern long-eared bat record is 96 miles away. Based on proximity to known records and lack of suitable summer roosting within the project area TVA has determined that there is little potential that Indiana bats and NLEBs would utilize the project area.

APPENDIX A: Phase 1 Summer Habitat Assessment Forms

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: Shelby-Drummonds 161-TL-Tap to Millington Solar-F Date: 8/2/2017
Township/Range/Section: Shelby County
Lat.Long./UTM/Zone: 35.349726, -89.836315 Surveyor: Logan Barber

Brief Project Description

TVA proposing to build a transmission line from TVA's existing Shelby 500-kV substation located off Mudville Road in Millington, TN to a new 161-kV substation located at the corner of Kerrville Rosemark Road and Bethuel Road in Millington, TN.

Project Area

	Total Acres	Forested Acres		Open Acres
Project	60	6		54
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres – no clearing	
	6	0	0	

Vegetation Cover Types

Pre-Project	Post-Project
Some forested fence rows of early growth forests and small segmented deciduous forests interspersed into large agricultural fields planted in soybeans and cotton.	Forested areas will be changed to early successional habitat. Agricultural fields will remain the majority of the project area.

Landscape within 5 mile radius

Flight corridors to other forested areas?

Big Creek and Casper Creek occur within the action area. No large flight corridors occur within 5 miles. The Mississippi River is approximately 28 miles west of the project footprint.

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources):

The overwhelming majority of the adjacent properties are agricultural fields planted mostly in soybeans and cotton with a few in planted in corn.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g. national or state forests, national or state parks, conservation areas, wildlife management area)?

Lower Hatchie National Wildlife Refuge is approximately 14 miles north
Wapanocca National Wildlife Refuge is approximately 19 miles to the west

APPENDIX A
PHASE I SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description:	
Sample Site No.(s) 1	The entire project is an an agricultural area with forested fence rows and property lines and small areas of fragmented forests. Fields are planted in soybeans and cotton. Fence rows and forest fragments consists of ash, box elder, cottonwood, elm, hackberry/sugarberry, poplar, red oak spp., and sweetgum. Invasives such as privet and tree of heaven often in understory along with blackberry, and poison ivy.

Water Resources at Sample Site				
	Ephemeral	Intermittent	Perennial	Describe existing conditions of water sources:
Stream Type (# & length)	6	0	6	Several field ditches in the forest fragments between fields. Small perennial streams in many of these same areas. Big Creek and Casper Creek are the largest of the perennial streams.
Pool/Ponds (# & size)	1 pond approx. 0.2acres	Open & accessible to bats?		
		-	Y	
Wetlands (approx. ac.)	Permanent	Seasonal		
	aprrox. 5.7acres	0		

Forest Resources at Sample Site				
Closure/Density	Canopy (>50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
	4	6	5	
Dominant Sp. Of Mature Trees	*Hackberry/sugarberry, ash, red oak species, poplar*			
% Trees w/ Exfoliating Bark	0	1	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	30	50	20	
No. of Suitable Snags: 2 (1 with exfoliating bark, 1 with a large cavity)				

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

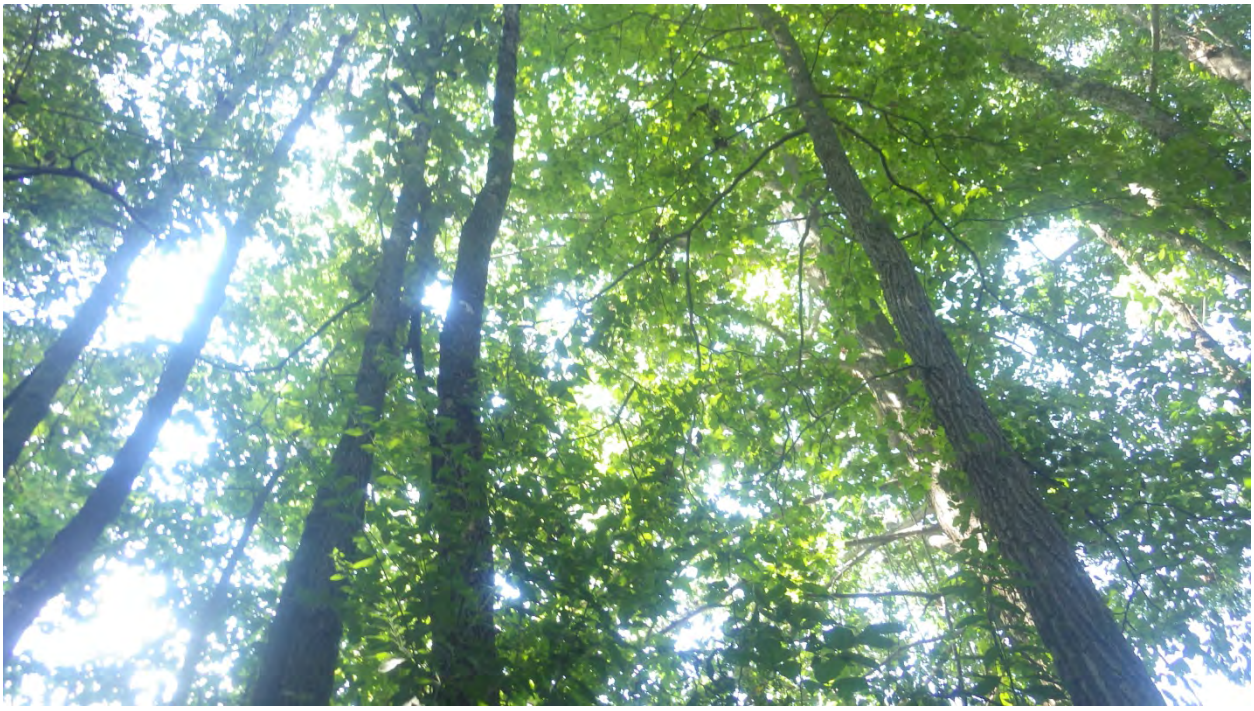
IS THE HABITAT SUITABLE FOR INDIANA BATS? Overall No

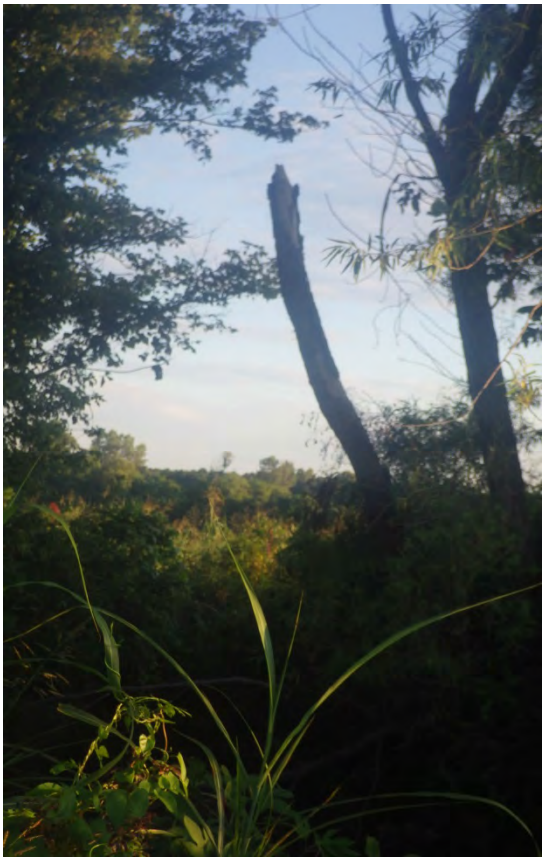
Additional Comments:	Two snags were identified as being potentially suitable out of the entire 6 acres of forest fragments. The two snags are not clustered and are on opposite ends of the proposed ROW. no other suitable roosting habitat for Indiana bat occurs along the 4.9 mile ROW.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources.

APPENDIX B: Photo Log





Bat Species Inventory

For

Silicon Ranch Solar Farm

Shelby County, Tennessee

Prepared By:

BWSC Barge Waggoner Sumner & Cannon, Inc.

Barge Waggoner Sumner & Cannon, Inc.

211 Commerce Street, Suite 600

Nashville, Tennessee 37201

In Cooperation with:

JACKSON GROUP

15 September 2016

BWSC | Barge Waggoner Sumner & Cannon, Inc.

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LIST OF TABLES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

Jackson Group of Richmond, Kentucky teamed with Barge Waggoner Sumner & Cannon, Inc. of Nashville, Tennessee to conduct a survey of federally listed threatened and endangered bat species for the Silicon Ranch Solar Farm (project area) located in Millington, Shelby County, Tennessee. The project area is generally located approximately 1.7 miles (mi) south of Kerrville, Tennessee (Attachment 1). The project area is mapped on the United States Geological Survey (USGS) Brunswick quadrangle, 7.5-minute series map, and is approximately centered at coordinates 35° 21' 13.8234", -89° 51' 24.3" North American Datum 1983 (NAD 83).

1.1 Project Purpose and Objective

The purpose of this project was to survey and inventory bat species, establishing the presence or probable absence of the federally listed endangered Indiana bat (*Myotis sodalis*) and threatened Northern Long-eared Bat (*M. septentrionalis)* in the project area. The project area contained approximately 90 acres (ac) of forested land. Based on the mist-netting guidelines/protocol provided in the Indiana Bat Revised Recovery Plan and the 2016 Range-Wide Indiana Bat Summer Survey Guidelines, April 2016, two mist-net sites were surveyed for a total of 9 net-nights. The objective of this project was to provide state and federal agencies with (1) an inventory of bats, (2) quantify bat species abundance and composition, and (3) evaluate the presence or probable absence of threatened and/or endangered bat species, specifically Indiana and Northern Long-eared bats, in the project area.

2.0 METHODS AND MATERIALS

2.1 General Habitat Characteristics

The project area is approximately 90 acres of forested land. Dominant overstory and mid-story species, where available, include Cottonwood (*Populus deltoides*), Pin Oak (*Quercus palustris*), and White Oak (*Q. alba*). The land within the project area is currently being used as a naval base and is surrounded by residential areas. Topography in the project area is characterized as flat, with past road construction projects.

2.2 Mist Netting

The project area was surveyed for presence/probable absence of federally listed threatened and endangered bat species in accordance with the guidelines established in the Indiana Bat Revised Recovery Plan, USFWS, (2007), 2016 Range-Wide Indiana Bat Summer Survey Guidelines, April 2016, and Northern Long-Eared Bat Interim Conference and Planning Guidance January 2014. Surveys were conducted between 10 August, 2016 and 11 August, 2016. As stated in the 2016 Guidelines; for every 123 acres of potential summer habitat a minimum of 9 net-nights of survey effort is required, therefore two net sites were established within the forested 90 acre project area. Before conducting mist-net surveys, a pedestrian assessment of the project area was conducted to determine the most suitable habitat in which to place the nets. The coordinates of specific net site locations was determined using Global Positioning System (GPS) and recorded. Each net site was surveyed for one night. Site 1 consisted of five net sets, (i.e., 5 net sets/net site) and Site 2 consisted of four net sets, (i.e., 4 net sets/net site), and each net was monitored for one night (9 net- nights). The net site locations were selected in an area that provided potential flight corridors that could serve as a natural funnel, which aids in capturing bats.

Bats were captured using black nylon mist-nets (38 mm mesh) ranging from 2.6 to 5.2 m in height and 4 to 9 m in width. Nets were opened approximately 30 minutes before sunset and checked every 10 minutes for at least five hours. Upon capturing a bat, the capture time, species, sex, and band presence of each captured bat is recorded while nets were opened. Bats are separated into individual paper bags and then processed (*i.e.*, measurements taken). Morphometric data collected includes: 1) species, sex, and age of

each animal; 2) the reproductive condition of each bat, (males-- nonreproductive or scrotal; females-- nonreproductive, pregnant, lactating, or post-lactating); and 3) forearm length and weight were measured. The date, times nets were opened and closed, weather conditions, and habitat type were recorded during each sampling effort.

2.3 Disinfection Protocol for White Nose Syndrome (WNS)

To prevent cross contamination of captured bats with *Pseudogymnoascus destructans*, the fungus that causes WNS, the USFWS WNS decontamination protocol was followed for all mist-netting and other survey efforts (USFWS 2016).

3.0 FINDINGS AND RESULTS

3.1 Mist-Netting Survey

Two net site locations were surveyed totaling 9 net-nights. No bats were captured at either site location. No federally threatened or endangered bats were captured during the survey.

Table 1 Bat Species Captured

Species	Site I.D. No. Captured
Myotis lucifugus	--
Myotis septentrionalis	--
Myotis sodalis	--
Myotis leibii	--
Lasionycteris noctivagans	--
Perimyotis subflavus	--
Eptesicus fuscus	--
Lasiurus borealis	--
Lasiurus cinereus	--
Nycticeius humeralis	--
Total	**0**

4.0 SUMMARY

Two net site locations were surveyed, totaling 9 net-nights on the proposed Silicon Ranch Solar Farm project area in Shelby County, Tennessee. No bats were captured at either site location. No federally threatened or endangered bats were captured during the survey. Given the absence of federally threatened or endangered bats, it is the opinion of Jackson Group that the proposed Silicon Ranch Solar Farm is not likely to adversely affect bat communities in the project area.

5.0 REFERENCES

Reichard, J.D. and T.H. Kunz. 2009. White-nose syndrome inflicts lasting injuries to the wings of little brown bats (*Myotis lusifugus*). Acta Chiropterologica 11:457-464.

United States Environmental Protection Agency. (USEPA) 2010. Ecoregions of North America. http://www.epa.gov/wed/pages/ecoregions/na_eco.htm#CEC%201997. Accessed 30 August 2010.

United States Fish and Wildlife Service (USFWS). 2007. Revised Indiana bat (*Myotis sodalis*) recovery plan.

United States Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat InterimConference and Planning Guidance, January 2014.

United States Fish and Wildlife Service (USFWS). 2016. 2016 Rangewide Indiana Bat Summer Survey Guidelines, April 2016.

BWSC | Barge Waggoner Sumner & Cannon, Inc.

Attachment 1

Project Maps

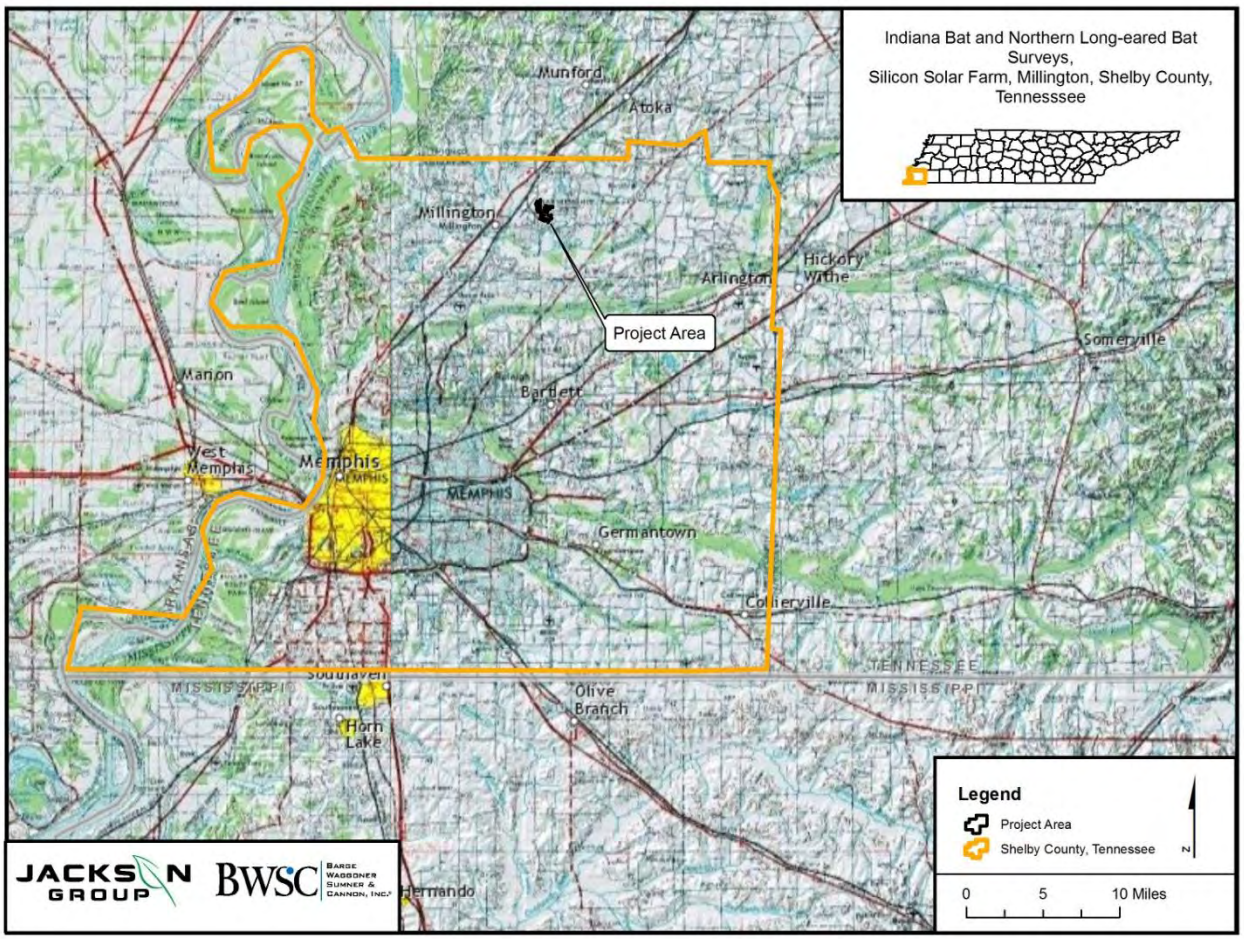


Figure 1: Vicinity Map

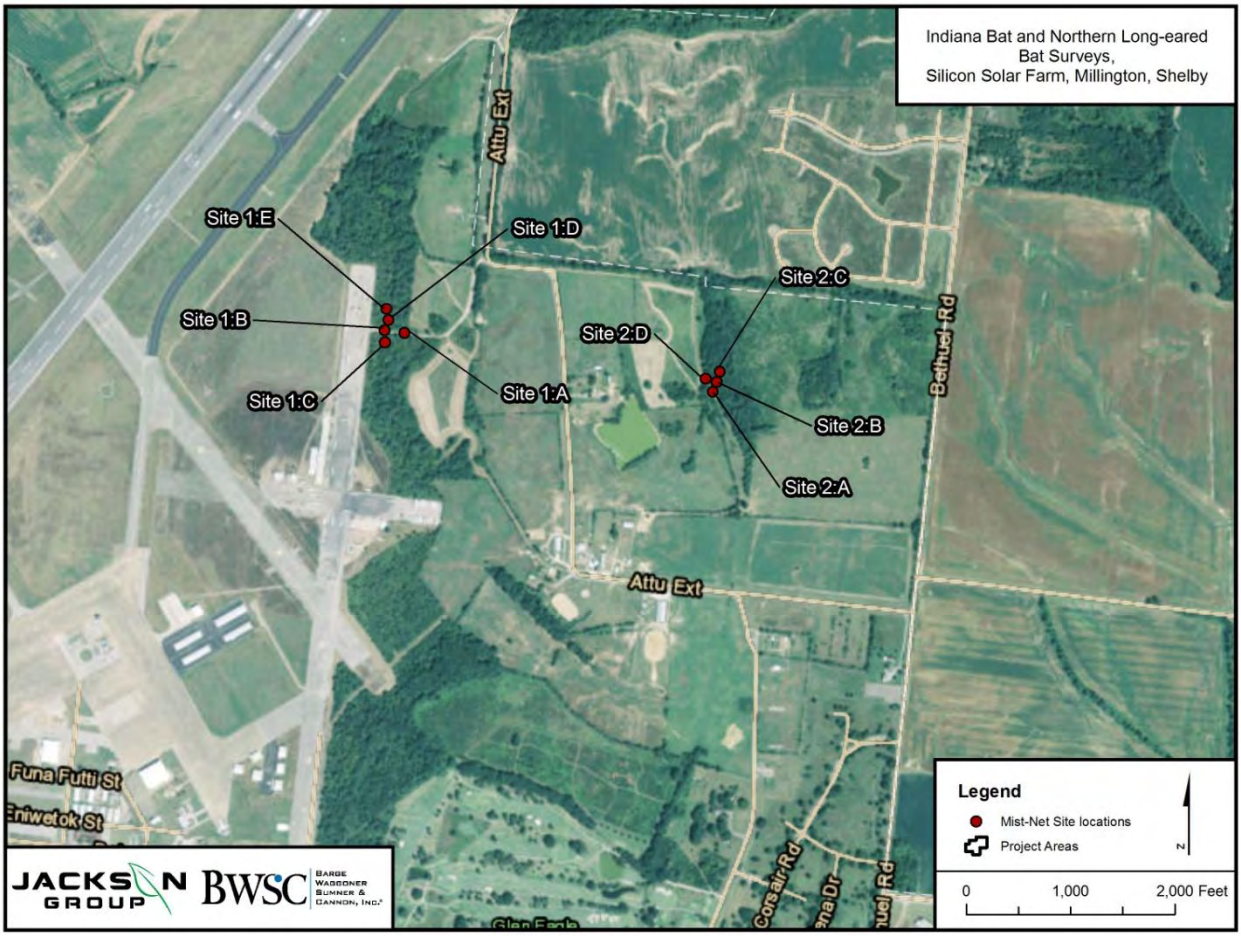


Figure 2: Project Area and Mist-Net Site Map

BWSC | Barge Waggoner Sumner & Cannon, Inc.

Attachment 2

Net Photos

BWSC Barge Waggoner Sumner & Cannon, Inc.

Photo: 1
By: J. Jackson
Date: 10 August 2016
Feature: Site 1 Net A

Photo: 2
By: J. Jackson
Date: 10 August 2016
Feature: Site 1 Net B

BWSC Barge Waggoner Sumner & Cannon, Inc.

Photo: 3
By: J. Jackson
Date: 10 August 2016
Feature: Site 1 Net C

Photo: 4
By: J. Jackson
Date: 10 August 2016
Feature: Site 1 Net D

BWSC Barge Waggoner Sumner & Cannon, Inc.

Photo: 5
By: J. Jackson
Date: 10 August 2016
Feature: Site 1 Net E

Photo: 6
By: J. Jackson
Date: 11 August 2016
Feature: Site 2 Net A

BWSC Barge Waggoner Sumner & Cannon, Inc.

Photo: 7
By: J. Jackson
Date: 11 August 2016
Feature: Site 2 Net B

Photo: 8
By: J. Jackson
Date: 11 August 2016
Feature: Site 2 Net C

BWSC Barge Waggoner Sumner & Cannon, Inc.

Photo: 9
By: J. Jackson
Date: 11 August 2016
Feature: Site 2 Net D

BWSC | Barge Waggoner Sumner & Cannon, Inc.

Attachment 3

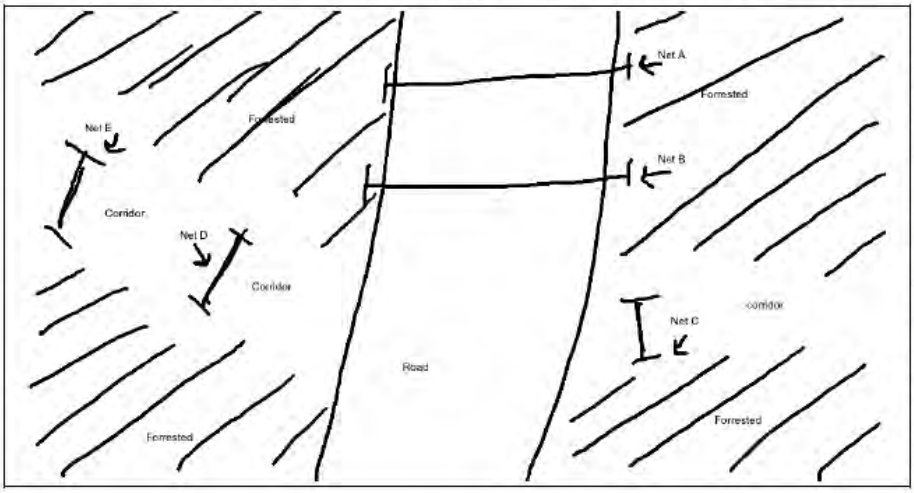
Bat Capture/Weather/Site Description Data Sheets

BWSC Barge Waggoner Sumner & Cannon, Inc.

Millington Solar Farm Net Site Data Sheet

Site No.: Site 1	Project Name: Millington Solar Farm	Site Name: JJ001	Date: 08/10/2016
County: Shelby	State: Tennessee	Company: Jackson Group	Surveyors: Jeremy Jackson
KM Block No.:	Approx. Mile Post (XXX.X):	Tract No.:	Permits: TE102292-10

Net Site Diagram: MillingtonSolarFarm_JJ001_NetSiteDiagram_1472169428367.png



Dominant Vegetation

1 Pin oak
2 White oak
3 Cottonwood

Net(s) or Acoustic Unit(s) by Habitat

Net	Habitat	Latitude	Longitude
Net A	Corridor	35.3559858911069	-89.8621963989826
Net B	Corridor	35.3560485877426	-89.8621782940718
Net C	Corridor	35.355995572205	-89.8617653177025
Net D	Corridor	35.3562373901115	-89.8622366321179
Net E	Corridor	35.3562973626287	-89.8621958960685

No. of Poles X Net length

Net A	6	X	5.2	=	31.2
Net B	9	X	5.2	=	46.8
Net C	4	X	2.6	=	10.4
Net D	4	X	2.6	=	10.4
Net E	4	X	2.6	=	10.4

Figure 3- Site 1 Net Data

BWSC Barge Waggoner Sumner & Cannon, Inc.

Millington Solar Farm Bat Capture Data Sheet

Site No.: Site 1	Project Name: Millington Solar Farm	Site Name: JJ001	Date:
County: Shelby	State: Tennessee	Company: Jackson Group	Surveyors: Jeremy Jackson
KM Block No.:	Approx. Mile Post (XXX.X):	Tract No.:	Permits: TE102292-10

#	Time	Species	Age	Sex	Repro. Cond.	RFA (mm)	Mass (g)	Net Name	Net Height	Guano/ Hair	Wing Score	Band # Type	Bat Photos	Note

Date	Moon Phase	Moon Illumination(%)	Moon Rise	Moon Set	Sun Rise	Sun Set
08/10/2016	Waxing Gibbous	53.3	01:29		06:17	19:54

Time	Temp	Sky	Wind	# Bats
20:30	28°C	Clear	Calm (0 mph)	0
21:30	27°C	Clear	Calm (0 mph)	0
22:30	26°C	Clear	Calm (0 mph)	0
23:30	25°C	Clear	Calm (0 mph)	0
00:30	25°C	Clear	Calm (0 mph)	0
01:30	24°C	Clear	Calm (0 mph)	0
01:30	24°C	Clear	Calm (0 mph)	0

Net(s) and/or Acoustic Unit(s) Lat/Long (DD.dddd):

#	Net Name	N	W	Compass	Net Photos
A	Net A	35.3560728114428	-89.8620667309406	162.802154541016	282.png
B	Net B	35.3560080193312	-89.8616705183777	36.4044685 36377	283.png
C	Net C	35.3559925966294	-89.8621148430648	254.176391601563	284.png
D	Net D	35.3562570875 84	-89.8622027692291	267.037200927734	287.png
E	Net E	35.3565373365165	-89.8619481270107	254.827407836914	288.png

#	Acoustic Unit Serial #	Brand

Start Time	End Time
20:30	01:30

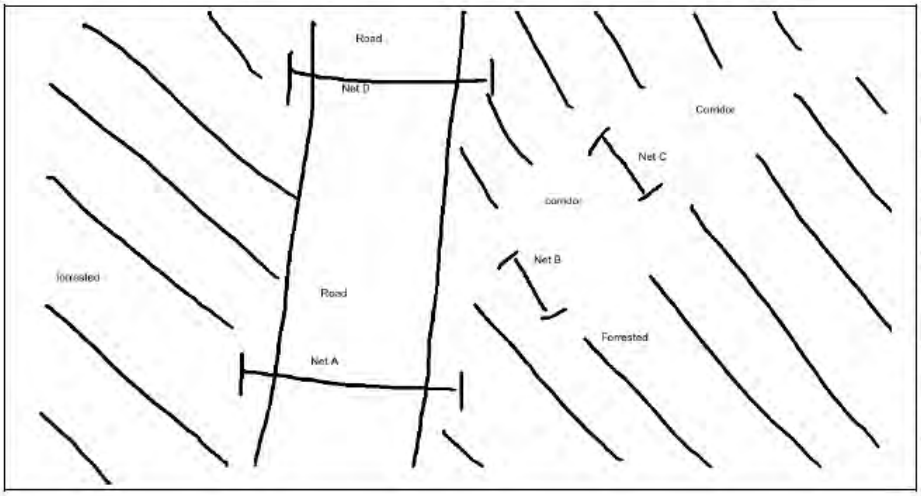
Figure 4- Site 1 Capture Data

BWSC Barge Waggoner Sumner & Cannon, Inc.

Millington Solar Farm Net Site Data Sheet

Site No.: Site 2	Project Name: Millington Solar Farm	Site Name: JJ002	Date: 08/11/2016
County: Shelby	State: Tennessee	Company: Jackson Group	Surveyors: Jeremy Jackson
KM Block No.:	Approx. Mile Post (XXX.X):	Tract No.:	Permits: TE102292-10

Net Site Diagram: MillingtonSolarFarm_JJ002_NetSiteDiagram_1472169843212.png



Dominant Vegetation

1 Pin oak
2 White oak
3 Cottonwood

Net(s) or Acoustic Unit(s) by Habitat

Net	Habitat	Latitude	Longitude
Net A	Corridor	35.3540835963842	-89.8524402484825
Net B	Corridor	35.3521763838951	-89.85398630206
Net C	Corridor	35.3544722032131	-89.8531761300655
Net D	Corridor	35.3544929078557	-89.8531989445542

No. of Poles X Net length

Net A	9	X	5.2	=	46.8
Net B	4	X	2.6	=	10.4
Net C	4	X	2.6	=	10.4
Net D	6	X	5.2	=	31.2

Figure 5 – Site 2 Net Data

BWSC Barge Waggoner Sumner & Cannon, Inc.

Millington Solar Farm Bat Capture Data Sheet

Site No.: Site 2	Project Name: Millington Solar Farm	Site Name: JJ002	Date:
County: Shelby	State: Tennessee	Company: Jackson Group	Surveyors: Jeremy Jackson
KM Block No.:	Approx. Mile Post (XXX.X):	Tract No.:	Permits: TE102292-10

#	Time	Species	Age	Sex	Repro. Cond.	RFA (mm)	Mass (g)	Net Name	Net Height	Guano/ Hair	Wing Score	Band # Type	Bat Photos	Note

Date	Moon Phase	Moon Illumination(%)	Moon Rise	Moon Set	Sun Rise	Sun Set
08/11/2016	Waning Gibbous	62.1	14:22	12:31	06:17	19:53

Time	Temp	Sky	Wind	# Bats
20:30	29°C	Few Clouds	Calm (0 mph)	0
21:30	28°C	Clear	Calm (0 mph)	0
22:30	26°C	Clear	Calm (0 mph)	0
23:30	26°C	Few Clouds	Calm (0 mph)	0
00:30	25°C	Few Clouds	Calm (0 mph)	0
01:30	25°C	Few Clouds	Calm (0 mph)	0

Net(s) and/or Acoustic Unit(s) Lat/Long (DD.dddd):

#	Net Name	N	W	Compass	Net Photos
A	Net A	35.3541280864233	-89.8525961378618	239.598281860352	292.png
B	Net B	35.3540428998513	-89.8523724889922	305.936035156250	293.png
C	Net C	35.354488192384	-89.8530021065022	287.686218261719	297.png
D	Net D	35.3547450234024	-89.8535170253797	228.576950073242	298.png

#	Acoustic Unit Serial #	Brand

Start Time	End Time
20:30	01:30

Site Photos: 291.png,294.png,294.png,294.png,299.png

Figure 6- Site 2 Capture Data

BWSC | Barge Waggoner Sumner & Cannon, Inc.

Attachment 4

Scientific Collection Permits

DEPARTMENT OF THE INTERIOR
U.S. FISH & WILDLIFE SERVICE
Ecological Services Permit Office
1875 Century Boulevard
Atlanta, GA 30345
permitsR4ES@fws.gov

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

JEREMY LYNN JACKSON
dba JACKSON ENVIRONMENTAL CONSULTING SERVICES
1586 BOONESBOROUGH ROAD
RICHMOND, KY 40475
U.S.A.

2. AUTHORITY-STATUTES
16 USC 1539(a)

REGULATIONS
50 CFR 17.22

50 CFR 13

3. NUMBER
TE102292-11 AMENDMENT

4. RENEWABLE
☒ YES
☐ NO

5. MAY COPY
☐ YES
☒ NO

6. EFFECTIVE
06/02/2016

7. EXPIRES
03/03/2018

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If it is a business)*

9. TYPE OF PERMIT
NATIVE ENDANGERED SP. RECOVERY - E WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Location: Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

11. CONDITIONS AND AUTHORIZATIONS

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

C. 1. In addition to the permittee, the following individuals are authorized to conduct activities as authorized by this permit: Dan Cox, Jason Damm, and Rex Medlin.

Trained assistants not named on this permit may work on permitted bat activities under the direct and on-site supervision of the individuals named above. However, trained assistants may not work independently at a site. Trained assistants are individuals who are considered qualified by the permitted biologist(s) to select sampling sites, deploy sampling equipment and nets, and handle bats in the field.

At least one named permittee must remain present at each mist-net or harp trap site while it is being operated.

D. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the terms of this permit and all sections of title 50 Code of Federal Regulations, parts 13 and 17, pertinent to issued permits. Section 11 of the Endangered Species Act of 1973, as amended, provides for civil and criminal penalties for failure to comply with permit conditions.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
Annual reports due by January 31 following each year this permit is in effect

ISSUED BY	TITLE	DATE
	CHIEF, DIVISION OF ENVIRONMENTAL REVIEW	06/02/2016

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

September 28, 2017

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), MILLINGTON SOLAR PROJECT, SHELBY COUNTY, TENNESSEE (-89° 51.530207' W, 35° 20.574203' N)

TVA proposes to enter into a Power Purchase Agreement (PPA) with SR Millington, LLC (Applicant), affiliated with Silicon Ranch Corporation (SRC), to purchase the electric power generated by a proposed solar photovoltaic (PV) facility near Millington, Shelby County, Tennessee. The proposed Millington Solar Facility would occupy approximately 390 acres of a 438-acre tract within the city limits of Millington, Tennessee. The solar generating facility would consist of multiple parallel rows of PV panels on single-axis tracking structures, direct current to alternating current inverters, and transformers. In addition to the PV facility, the Applicant proposes to construct access roads, electrical infrastructure, a substation and security fencing. TVA also plans to construct an approximately 5-mile long 161-kV Shelby-Drummonds Transmission Line (TL) interconnection to the solar facility. TVA considers the PPA and proposed TL construction to be related parts of a single undertaking, the Millington Solar Project, which has the potential to affect historic properties. We are initiating consultation with your office under Section 106 of the National Historic Preservation Act for this undertaking.

TVA has determined the archaeological area of potential effects (APE) to be the 438-acre tract proposed for the construction of the Millington Solar Facility and the approximately 5-mile long by 100-ft wide TL corridor including off-right of way (ROW) guy wire locations. The archaeological APE will be revised once the location of the access roads has been determined. TVA has determined the architectural APE to be areas within a visual line of site and within a 0.5 mile radius surrounding the 438-acre tract and the proposed TL.

The 438-acre tract was formerly part of the Naval Support Activity Mid-South facility, formally known as the U.S. Naval Air Station Memphis. That facility was previously subject to two Section 106 reviews conducted by the Department of Defense (DOD). Pursuant to the Defense Base Realignment and Closure (BRAC), the DOD proposed in 1999 to close and partially disposed of the Naval facility. Approximately 366 acres of the current archaeological APE were

included in that review (Figures 1.1 and 1.2 in the enclosed report). Your office concurred with the DOD's assessment that no archaeological investigations were required due to extensive previous disturbance and development. The remaining 72 acres of the current APE were included in a Section 106 review associated with a real estate grant for the construction of a solar facility. In a letter dated April 21, 2015, your office concurred with DOD's no effect finding.

Architectural assessments were conducted during the DOD's previous reviews associated with BRAC and the proposed 72-acre solar farm. That assessment identified one historic property (Building N-1). The DOD, in consultation with your office, mitigated the adverse effects to Building N-1 and the structure is no longer extant. Seven circa 1940s military housing buildings (Buildings 551, 554, 553, 550, 591, 592) recorded during the DOD's Integrated Cultural Resources Management Plan were identified within the viewshed. All seven were previously determined eligible for the National Register of Historic Places (NRHP). The DOD, in consultation with your office, determined that the 72-acre solar facility would have no effects on these seven properties due to existing vegetative screening and a golf course that would serve as visual buffers to the project area. The previous proposed 72-acre solar farm encompasses the southern portion of the 438-acre tract. Both the vegetative screening and golf course will remain unchanged. As such, TVA finds that the proposed undertaking would have no effect to Buildings 551, 554, 553, 550, 591, 592.

The Applicant contracted with Brockington and Associates to conduct an architectural assessment of the remaining APE (Figure 1.1 and 1.2 in the enclosed report). Please find the resulting report titled *Phase I Cultural Resources Survey of the Millington Solar Tract* enclosed. Two previously recorded (SY32718 and SY32632) and six newly recorded (1-6) architectural resources were identified within the APE. Brockington and Associates recommends SY32718, SY32632, and Resources 1-6 ineligible based on lack of integrity, association with a significant event(s) or person(s) and/or architectural distinction. TVA agrees with the recommendations of the authors.

TVA finds that the proposed 438-acre solar facility would have no effects on historic properties. TVA is currently conducting a Phase I survey for the transmission line right-of-way (ROW) and off-ROW guy wire anchors. TVA will consult with your office on the results of this survey. The associated access roads have not been determined at this time. By this letter, TVA is also providing you notification that TVA is proceeding under the phased process to conduct identification, evaluation and application of criteria of adverse effect as provided for under 36 CFR § 800.4(b)(2) and § 800.5(a)(3) for the project.

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's findings that the 438-acre solar facility will have no effect on historic properties.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting 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.

Should you have any questions or comments, please contact Michaelyn Harle in Knoxville, by email, mharle@tva.gov or by phone, (865) 632-2248.

Sincerely,

Edward W. Wells

Edward W. Wells on Behalf of Clinton E. Jones
Manager
Cultural Compliance

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

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

October 12, 2017

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

RE: TVA / Tennessee Valley Authority, Millington Solar Project, Millington, Shelby County, TN

Dear Mr. Jones:

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

Considering the information provided, we concur that no historic properties eligible for listing in the National Register of Historic Places will be affected by this undertaking. If project plans are changed or archaeological remains are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Questions or comments may be directed to Jennifer Barnett (615) 687-4780.

Your cooperation is appreciated.

Sincerely,

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

EPM/jmb

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

November 15, 2017

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Pike
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), SHELBY-DRUMMONDS 161-KV TRANSMISSION LINE PROJECT, SHELBY COUNTY, TENNESSEE

We recently consulted with your office through a letter dated September 28, 2017 regarding the proposed Millington Solar Project in Shelby County, Tennessee and noted that the proposed solar project would be connected to TVA's electrical power grid via a new transmission line (TL) to be constructed by TVA. The Area of Potential Effects (APE) for archaeological resources, for the proposed Shelby-Drummonds 161-kV TL, consists of an approximately 5-mile long by 100-foot wide corridor that TVA initially proposed for the TL, 6 off right-of-way (ROW) guy wire locations, and 2 re-routes of the TL corridor, 1 approximately 3.6 miles in length and a second of approximately 0.5-miles in length. The combined area of the originally proposed ROW and the 2 re-routes are approximately 115 acres. The archaeological APE will be revised once the location of any off-ROW access roads has been determined. TVA determined the architectural APE for the TL to be areas within a visual line of site and within a one-half mile radius surrounding the proposed TL centerline.

In July, August and September of this year, TVA contracted with Tennessee Valley Archaeological Research (TVAR) for a Phase I Cultural Resources survey of the APE for the TL. Enclosed are two bound copies of the draft report titled, *Phase I Cultural Resources Survey of the Tennessee Valley Authority's Planned Shelby-Drummonds Transmission Line in Millington, Shelby County, Tennessee*, along with two CDs containing digital copies of the report. TVA has reviewed this report and agrees with the recommendations of the author.

Background research indicated that 21 architectural resources (SY-32402/Paw Paw Block Farm [which includes eleven contributing outbuildings recorded as SY- 32298, 32307, 32308 and 32313-32318, SY-32400 and 32403]; SY-32112, 32627-32631, and 32721-32723) were previously recorded within the APE. The architectural survey identified six newly recorded resources (IS-1 through IS-6) within the APE. Four of the previously recorded resources (SY-32627, 32628, 32631 and 32721) are extant but located outside the viewshed of the project area. Resources SY-32315, 32403 and 32723 are no longer extant. SY- 32112, 32298, 32307, 32308, 32400, 32629, 32630 and 32722 are not eligible for the NRHP due to modern alterations

and lack of architectural distinction. Your office determined The Paw Paw Block Farm (SY-32402) eligible for the NRHP in 2003. Based on the current study, TVA has determined that the house that anchors the farm (SY-32402) and associated outbuildings SY-32313, 32314, 32316, 32317 and 32318 continue to be eligible for the NRHP under Criterion A for their significance in the area of agriculture. Newly recorded architectural resources, IS-1 through IS-6, are recommended ineligible for the NRHP due to their lack of architectural distinction and loss of integrity caused by modern alterations.

Architectural Resources in the APE

Resource No.	**When recorded**	**NRHP Eligibility/Status**
SY-32402	Previously (Paw Paw Block Farm)	Eligible
SY-32313	Previously (contributing element)	Eligible
SY-32314	Previously (contributing element)	Eligible
SY-32316	Previously (contributing element)	Eligible
SY-32317	Previously (contributing element)	Eligible
SY-32318	Previously (contributing element)	Eligible
SY-32315	Previously (contributing element)	Non-extant
SY-32403	Previously (contributing element)	Non-extant
SY-32723	Previously	Non-extant
SY-32298	Previously (contributing element)	Not eligible
SY-32307	Previously (contributing element)	Not eligible
SY-32308	Previously (contributing element)	Not eligible
SY-32400	Previously (contributing element)	Not eligible
SY-32112	Previously	Not eligible
SY-32629	Previously	Not eligible
SY-32630	Previously	Not eligible
SY-32722	Previously	Not eligible
IS-1	Current survey	Not eligible
IS-2	Current survey	Not eligible
IS-3	Current survey	Not eligible
IS-4	Current survey	Not eligible
IS-5	Current survey	Not eligible
IS-6	Current survey	Not eligible
SY-32627	Previously	Outside viewshed
SY-32628	Previously	Outside viewshed
SY-32631	Previously	Outside viewshed
SY-32721	Previously	Outside viewshed

TVAR recommends that Paw Paw Block Farm (consisting of NRHP-eligible resources SY-32402, SY-32313, 32314, 32316, 32317 and 32318) would be affected indirectly by the proposed new TL, as there are relatively unobstructed lines of sight to the project location approximately 0.35 miles away. However, TVAR recommends further that the effect would not

be adverse because the integrity of setting has been compromised previously due to the construction of a modern transmission line, electrical substation, and residential development. Based on this analysis, TVA finds that the undertaking would have no adverse direct or indirect effects to any aboveground historic property.

No previously recorded archaeological sites were identified within the APE during the background research. The archaeological survey identified seven newly recorded archaeological sites (40SY769 - 40SY775), a non site locale (JWR002) and two isolated finds. All of these sites represent portions of larger sites that extend outside of the TL ROW. The portions of these sites within the APE lack research potential and thus no further investigation of these sites is recommended in connection with the undertaking as currently proposed.

Pursuant to 36 CFR Part 800.5(b), we are seeking your concurrence with TVA's findings and recommendations that no historic properties would be adversely affected by the proposed TL.

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

Should you have any questions or comments, please contact Marianne Shuler in Knoxville by email, mmshuler@tva.gov or by phone, (865) 632-2464.

Sincerely,

Michaelyn S. Harle on Behalf of Clinton E. Jones
Manager
Cultural Compliance

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

TENNESSEE HISTORICAL COMMISSION
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December 7, 2017

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

RE: TVA / Tennessee Valley Authority, Shelby-Drummonds 161-KV Transmission Line Project, , Shelby County, TN

Dear Mr. Jones:

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

Based on the information provided, we concur with your eligibility assessments for the 27 total architectural resources and 7 total archaeology resources. We also concur that the project area contains a cultural resource eligible for listing in the National Register of Historic Places, the Paw Paw Block Farm. We further concur that the project as currently proposed will not adversely affect this historic property.

This office has no objection to the implementation of this project as currently planned. If project plans are changed or previously unevaluated archaeological resources are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Questions and comments may be directed to Casey Lee (615 253-3163). We appreciate your cooperation.

Sincerely,

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

EPM/cjl