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SELMER NORTH II SOLAR PROJECT

McNairy County, Tennessee

DRAFT ENVIRONMENTAL ASSESSMENT

Prepared for:
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Knoxville, Tennessee

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CHAPTER 1

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) proposes to enter into a power purchase agreement (PPA) with Selmer North II, LLC, the facility-specific entity affiliated with Silicon Ranch Corporation (SRC), to purchase the electric power generated by a proposed solar photovoltaic (PV) facility in Selmer, McNairy County, Tennessee. The proposed solar facility is Selmer North II, known as "Selmer II," which would have direct current (DC) generating capacity of 10 megawatts (MW). The proposed solar facility known herein as the "Project" would be constructed and operated by SRC. The PPA has been executed through TVA's Renewable Standard Offer (RSO) program, under which TVA agrees to purchase qualifying renewable energy at set prices for a 20-year period.

The proposed Selmer II solar facility would occupy 73 acres of a 117-acre tract owned by SRC, approximately 1.5 miles west of Selmer (Figures 1, 2, and 3). The 117-acre tract is known herein as the "project site." The solar generating facility would consist of multiple parallel rows of PV panels on single-axis tracking structures, DC to alternating current (AC) inverters, and transformers. The Selmer II facility would tie into an existing 25-kV distribution line owned by Pickwick Electric Cooperative (Pickwick Electric), approximately 0.25 mile west of the project site, which would transmit power to the TVA network.

1.1 PURPOSE AND NEED FOR ACTION

In its 2011 Integrated Resource Plan (IRP; TVA 2011) TVA established the goal of increasing its renewable energy generating capacity by 1,500 to 2,500 MW by 2020. TVA established the Renewable Standard Offer (RSO) program as one of the means of meeting this goal. Under the RSO program, TVA purchases energy at established terms and conditions (the "standard offer") from operators of qualifying renewable energy-generating facilities. Qualifying facilities must be new, located within the TVA service area, and must generate electricity from specific technologies or fuels. Solar PV generation is one of the qualifying technologies. SRC and the Project have met the qualifications for the RSO program, and TVA must decide whether to execute the PPA.

TVA's 2015 IRP (TVA 2015) recommends the continued 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.

1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and the Act'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 and TVA's NEPA procedures (TVA 1983) to assess 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 solar facility.

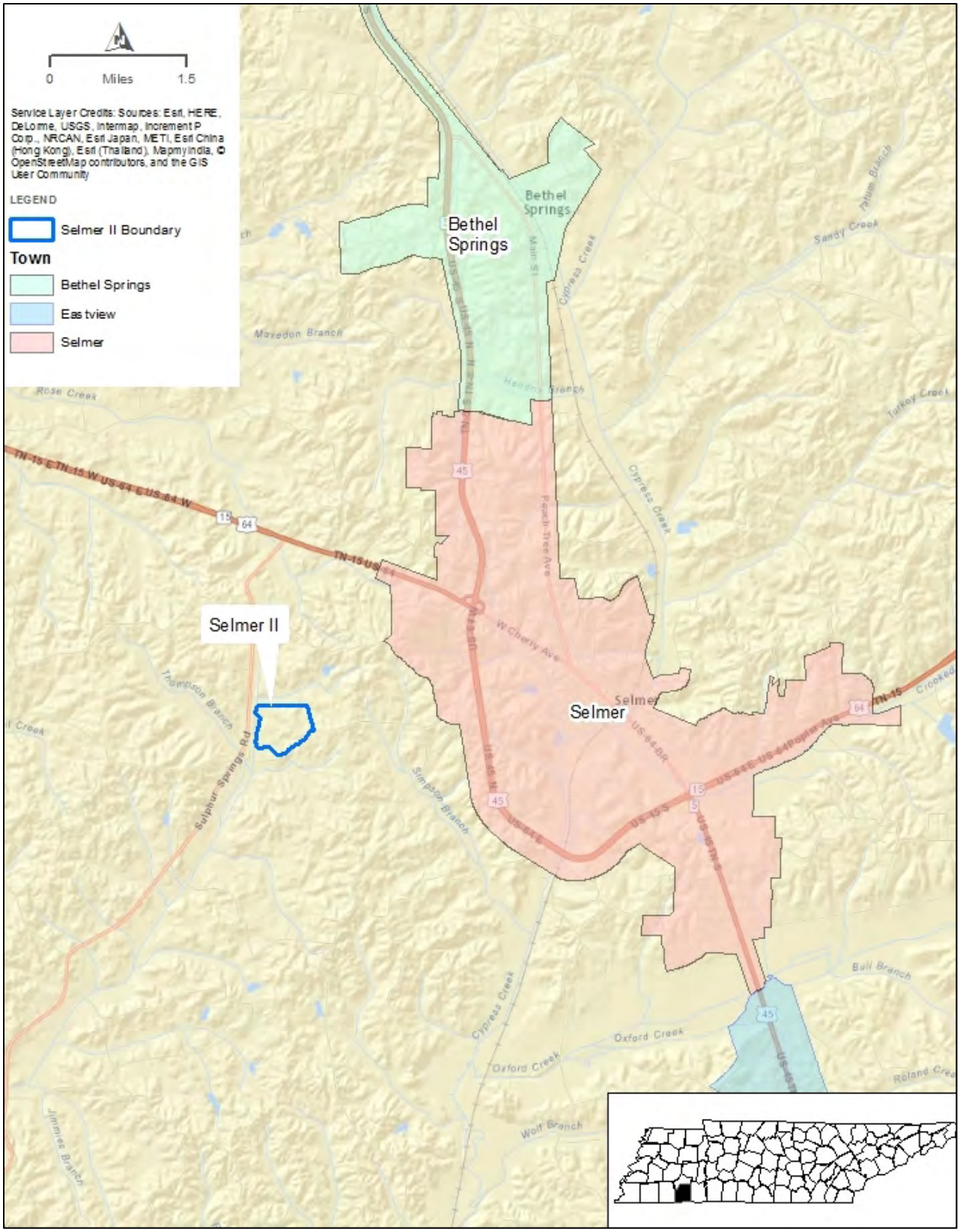

Figure 1. **Site location in McNairy County, Tennessee.**

TVA's Proposed Action would result in the construction and operation of the proposed solar facility by SRC, as well as the construction and operation of the electrical interconnection by Pickwick Electric. The scope of this EA therefore focuses on impacts related to the construction and operation of the proposed solar facility and associated electrical interconnection.

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.

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 would 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 listed below for analysis within this EA: Land Use; Geology, Soils, and Prime Farmland; Water Resources; Biological Resources; Visual Resources; Cultural 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 Project Alternative, resource areas potentially impacted, and analyses of impacts. 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 Alternative, and discusses 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.

1.3 PUBLIC INVOLVEMENT

This Draft EA has been issued for review and comment for a 30-day period. It has been posted on the TVA website and notices of its availability and requests for comments have been sent to government agencies, organizations, and individuals who indicated an interest in the Project. TVA has also announced its availability and requested comments in a press release and in the local media.

1.4 REQUIRED PERMITS AND LICENSES

A Tennessee Construction General Permit (National Pollutant Discharge Elimination System [NPDES] Permit No. TNR100000) would be required for construction of the solar facility and associated electrical interconnection on the 117-acre project site. 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 of development that will disturb more than 1 acre. This requirement is governed by Section 402 of the Clean Water Act (CWA).

A site-specific Stormwater Pollution Prevention Plan (SWPPP) is required under the Construction General Permit and must be submitted to TDEC as part of the permitting process. The SWPPP should address 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.

CHAPTER 2

2.0 DESCRIPTION OF THE PROPOSED SOLAR PROJECT AND ALTERNATIVE

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.

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 Selmer North II, LLC (i.e., TVA would not be involved with the Project) and the solar facility would not be constructed and operated by SRC. Existing conditions (land use, natural resources, visual resources, and socioeconomics) in the project area would remain unchanged. The property would remain as predominantly undeveloped and forest management activities would likely continue on site. SRC would retain the property for future development. TVA would continue to rely on other sources of generation described in the 2015 IRP (TVA 2015) to ensure an adequate energy supply and to meet its goals for increased renewable and low-greenhouse gas (GHG) emitting generation.

2.2 PROPOSED ACTION ALTERNATIVE

Under the Proposed Action Alternative, TVA would enter into a 20-year PPA with Selmer North II, LLC and SRC would construct and operate the 10-MW Selmer II single-axis tracking PV solar power facility in McNairy County, Tennessee. The proposed Selmer II facility would occupy approximately 73 acres of land in the center of a predominately undeveloped 117-acre parcel. The proposed Selmer II facility is located approximately 1.5 miles west of the town of Selmer, Tennessee and would connect to an existing 25-kV distribution line owned by Pickwick Electric, approximately ¼ mile west of the site along Sulphur Springs Road. This EA assesses the impact of TVA's action to enter into the PPA and the associated impact of the construction and operation of the proposed solar facility by SRC and the electrical interconnection by SRC and Pickwick Electric.

2.2.1 Project Description

The project site consists of one primarily undeveloped parcel of land owned by SRC, about 117 acres in size, approximately 1.5 miles west of Selmer town limits. Much of the site is a pine plantation with immature trees and existing logging roads (Figure 2).

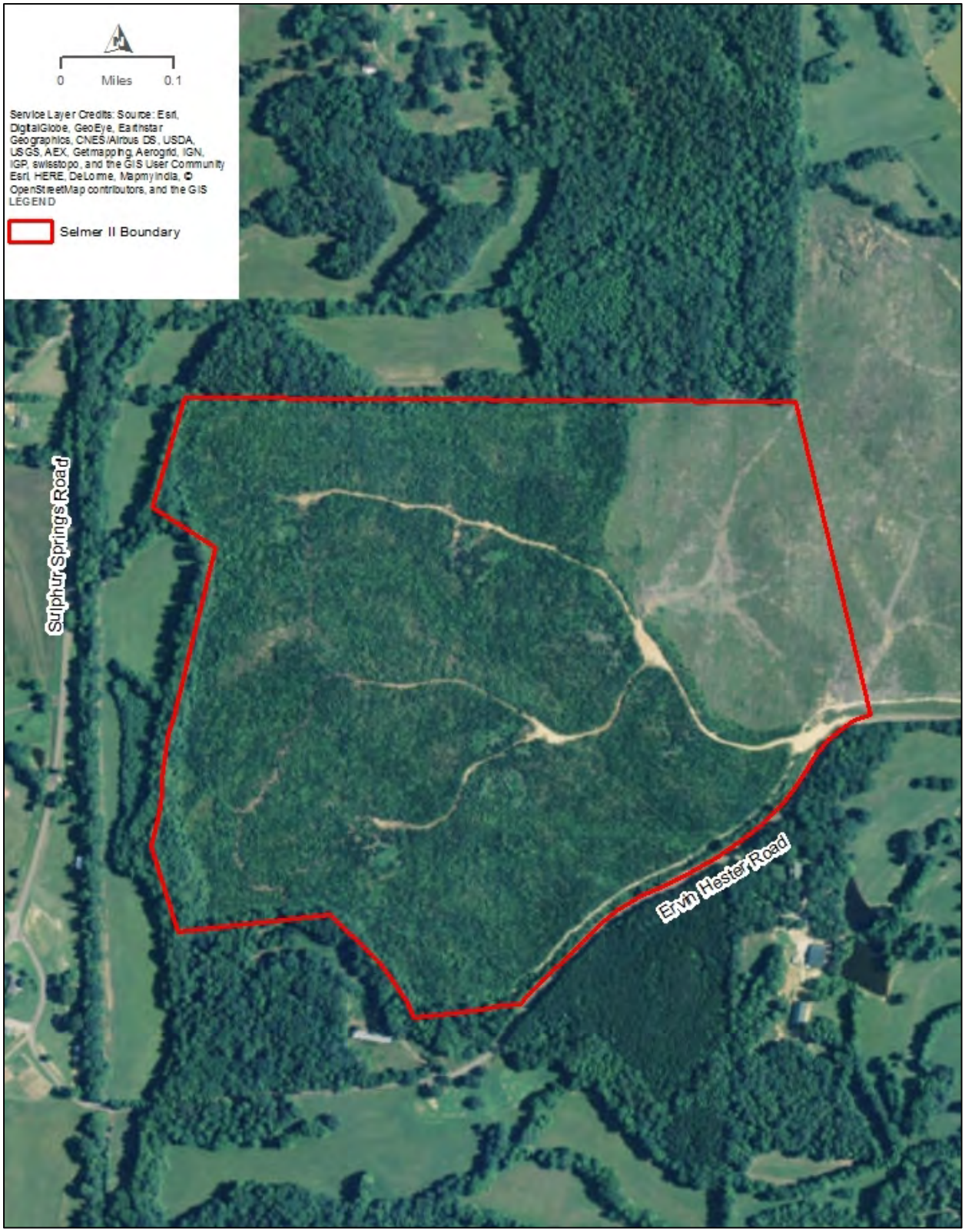

Figure 2. Site aerial showing Selmer II boundary.

The project area is approximately 520 feet above mean sea level (amsl) and hilly with a 30- to 50-foot change in elevation. The site is accessible from Ervin Hester Road to the southeast, using existing logging roads. The proposed Selmer II solar facility would tie into an existing Pickwick Electric 25-kV distribution line along Sulphur Springs Road about 0.25 mile west of the project site, which continues to the north to the Pickwick Electric Substation outside the project area. The perimeter of the approximately 73-acre area of solar arrays, roads, and project infrastructure would be enclosed by chain-link fencing (Figure 3).

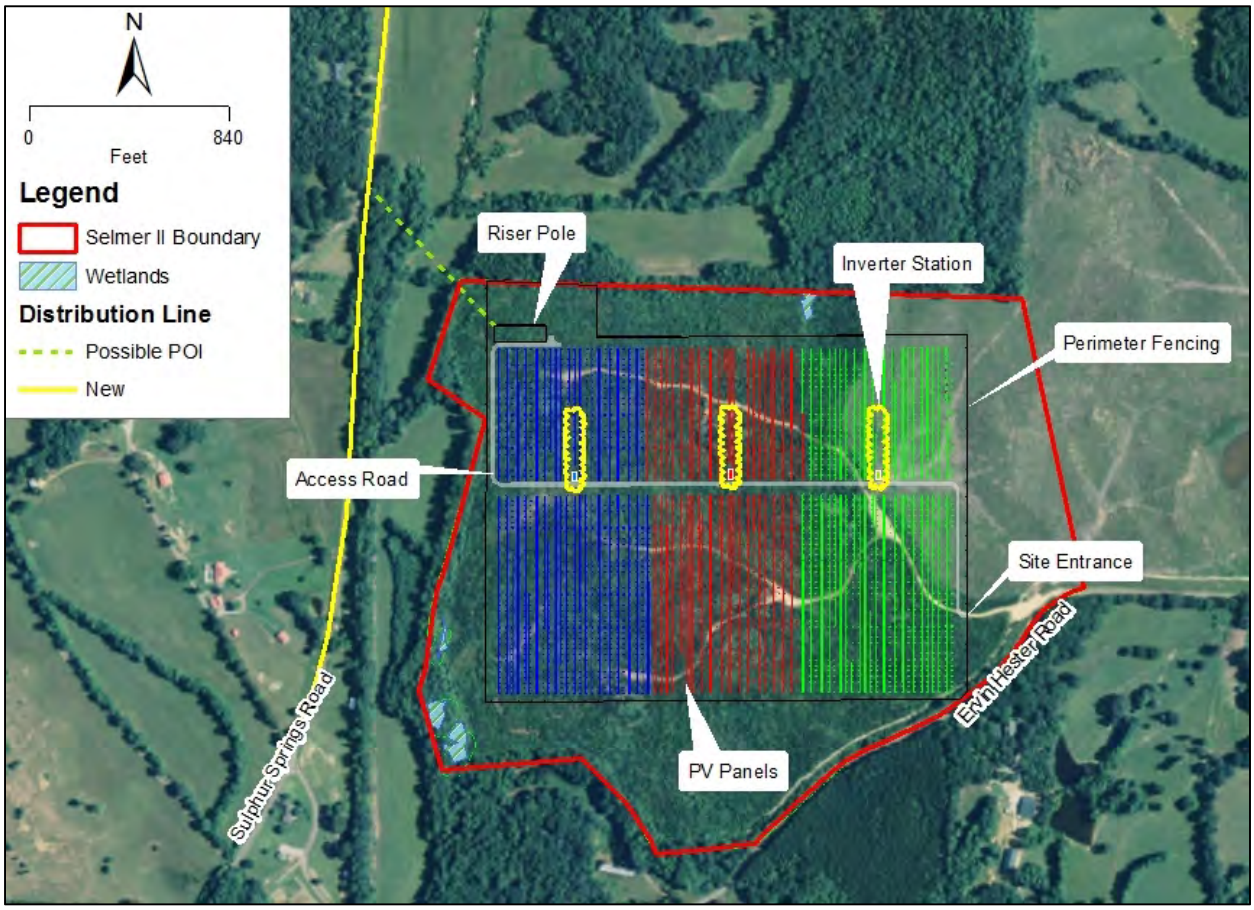

Figure 3. Aerial photograph showing site facility layout.

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. This Project would convert sunlight into DC electrical energy within polycrystalline PV panels (Photo 1).

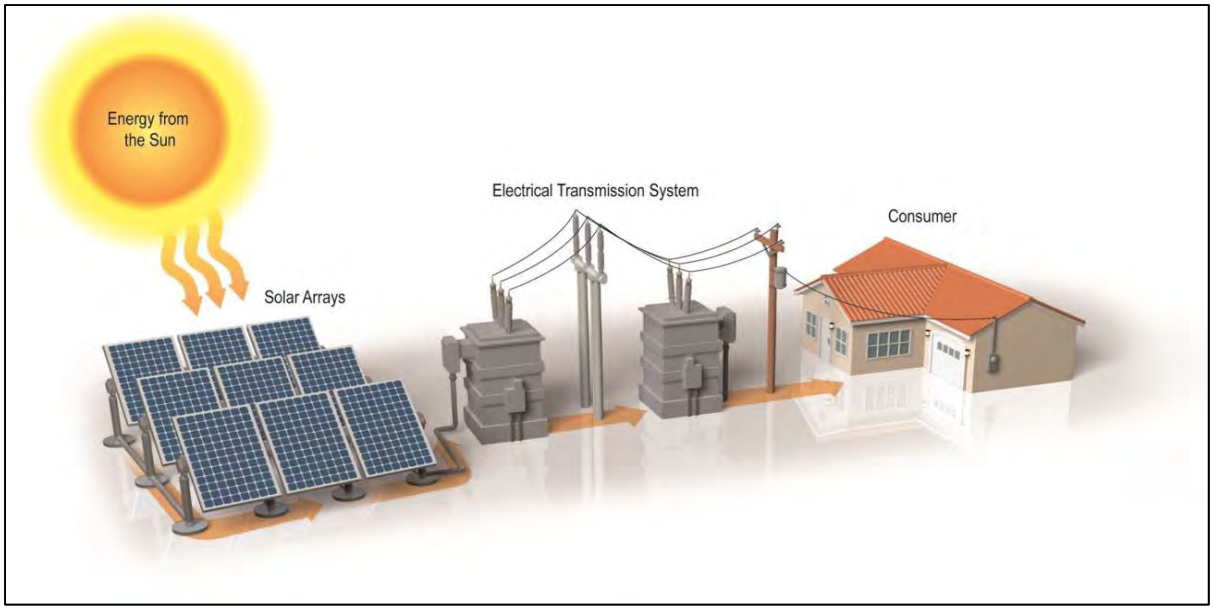

Photo 1. General energy flow diagram of PV solar system.

The Selmer II facility would be comprised of a total of 88,560 PV panels (modules) each capable of producing approximately 112.5 watts, and mounted together in arrays (Figures 3 and 4). These arrays would be grouped into three individual blocks, each with an output of approximately 3.3 MW AC. Each block would consist of the PV arrays and a power conversion station (PCS), or inverter station, that includes 1,500V 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/substation.

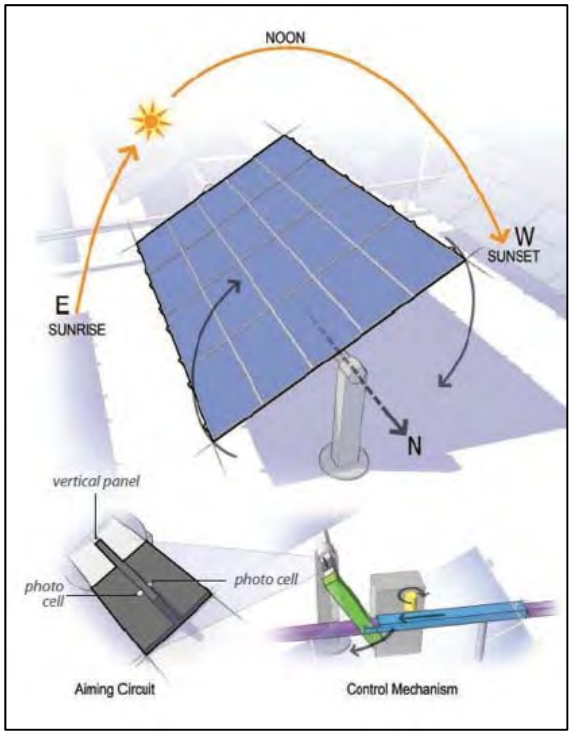

Photo 2. Diagram of single-axis tracking system.

The PV panels would be mounted on motor-operated axis tracker structures, commonly referred to as single-axis trackers. The axis trackers would be designed to follow the path of the sun from the east to the west across the sky. 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 an approximate depth of 6 to 10 feet below grade (Photo 2).

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 a PCS 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 PCS would be transformed into the AC collection voltage, typically 25 kV, at pad-mounted transformers. The underground voltage collection circuits would deliver AC electricity from the transformers to the project's on-site pole-mounted riser in the northwest corner of the site. A disconnect switch, recloser, and metering would be installed at the riser. A new powerline would run from the riser to Pickwick Electric's existing overhead lines along Sulphur Springs Road about 0.25 mile west of the project site.

2.2.2 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 sedimentation basins, 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.

SRC's standard practice is to work with the existing landscape (e.g., slope, drainage, utilization of existing roads, avoidance of wetlands and other sensitive areas) where feasible and minimizing or eliminating 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, sedimentation basins, 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 postconstruction using a mixture of certified weed-free, low-growing native grass seed. 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 activities at the site are 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 73 acres of the 117-acre project site would be cleared and graded for construction and placement of the solar panels, gravel access roads, and accompanying electrical components within the fenced-in area. The majority of the project site is a pine plantation with immature trees. The majority of these trees would be cleared and the project site would be cut and filled to meet grade requirements. No buffers are required as all streams and wetlands would be avoided (Figure 3). Once any sensitive areas are marked, construction areas would be cleared and mowed of vegetation and miscellaneous debris. Ongoing mowing and clearing operations would continue as needed, to contain growth during construction, thereby limiting clearing to the maximum extent.

On-site sedimentation basins, berms, and ditches would be constructed throughout the project site to temporarily store stormwater and slowly release it to not increase the off-site runoff during construction. The project site would contain three sedimentation basins: one in the southwest corner of the site with a drainage area of 23.5 acres, one in the northwest corner of the site with a 19.3 acre drainage area, and one in the southeast/south-central portion of the site with a 11.9-acre drainage area. The ponds 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. The basin would contain an emergency spillway, forebay area, nonporous baffles, and riprap with filter cloth. Water from the basins would be released into adjacent ditches along the perimeter of the site through specially designed outlets or discharge structures (18-inch diameter discharge pipes), which would allow increased flow volume as the water level in the basin increases.

Construction would be sequenced to minimize the exposure time of the disturbed areas. Silt fence would surround the site perimeter, including the ditches. 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 postconstruction. A good 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) office would be used. 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), hydro seeding 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 site 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 the construction period. Temporary construction trailers used for material storage and office space would be parked on the site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. 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 electrical power and instrumentation would be placed. Once all of the individual systems have been tested, integrated testing of the Project would occur. Array

construction vehicles would include pick-up trucks to transport materials and workers on access roads and array aisles.

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 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 Project would include a pole-mounted switch. Distribution system/electrical interconnection details are provided in Section 2.2.3 below.

The perimeter of the 117-acre project site would be securely fenced with 7-foot-high chain-link security fence during construction and the perimeter of the approximately 73-acre area of solar panels, access roads, and electrical components would be enclosed with 7-foot-high chain-link security fence with three strands of barbed wired on the top for the duration of the Project operation (Figure 3). Construction activities for the proposed Selmer II facility would take approximately 3 to 5 months with a crew that ranges from 50 to 100 workers at the peak of construction. Work would generally occur 7 days a week from 7 am to 6:30 pm. Additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities.

2.2.3 Electrical Interconnection

The proposed solar facility would tie into the Pickwick Electric distribution system via an existing 25-kV distribution line owned by Pickwick Electric approximately 0.25 mile west of the project site along Sulphur Springs Road. The proposed solar facility would require Pickwick Electric to extend a new line with new poles from their existing distribution line to the point of interconnection (POI) for the Selmer II facility. The POI would be in the northwest corner of the project site where it would connect to a pole-mounted switch on site. Once Pickwick Electric determines the path to the site and obtains the required easement and permits to connect their distribution line to the proposed Selmer II solar facility, SRC would mount the pole with the meter and switch on site and tie into the Pickwick Electric line along Sulphur Springs Road, which continues north to the Pickwick Electric Substation approximately 4 miles north of the project site. Approximately 1.7 miles of the existing Pickwick Electric 25-kV distribution line north of the Selmer II project site (Figure **4**) would also be upgraded by replacing the conductors to accommodate electricity generated by the Selmer II facility. No poles would be replaced or installed for the upgraded lines. An existing fiber optics line currently ends approximately 1½ miles from the Pickwick Electric Substation. Fiber optics are used for communication of signals associated with the recloser and meters at the site. The fiber would need to be extended an additional 3.8 miles to the proposed Selmer II site. The fiber optics would tie into the Pickwick Electric system at the substation. The exact path of the fiber optics line to the substation has not been specified, but would likely follow the path of the new ¼-mile-long electrical line and the 1.7-mile-long upgraded section of line along Sulphur Springs Road to the substation.

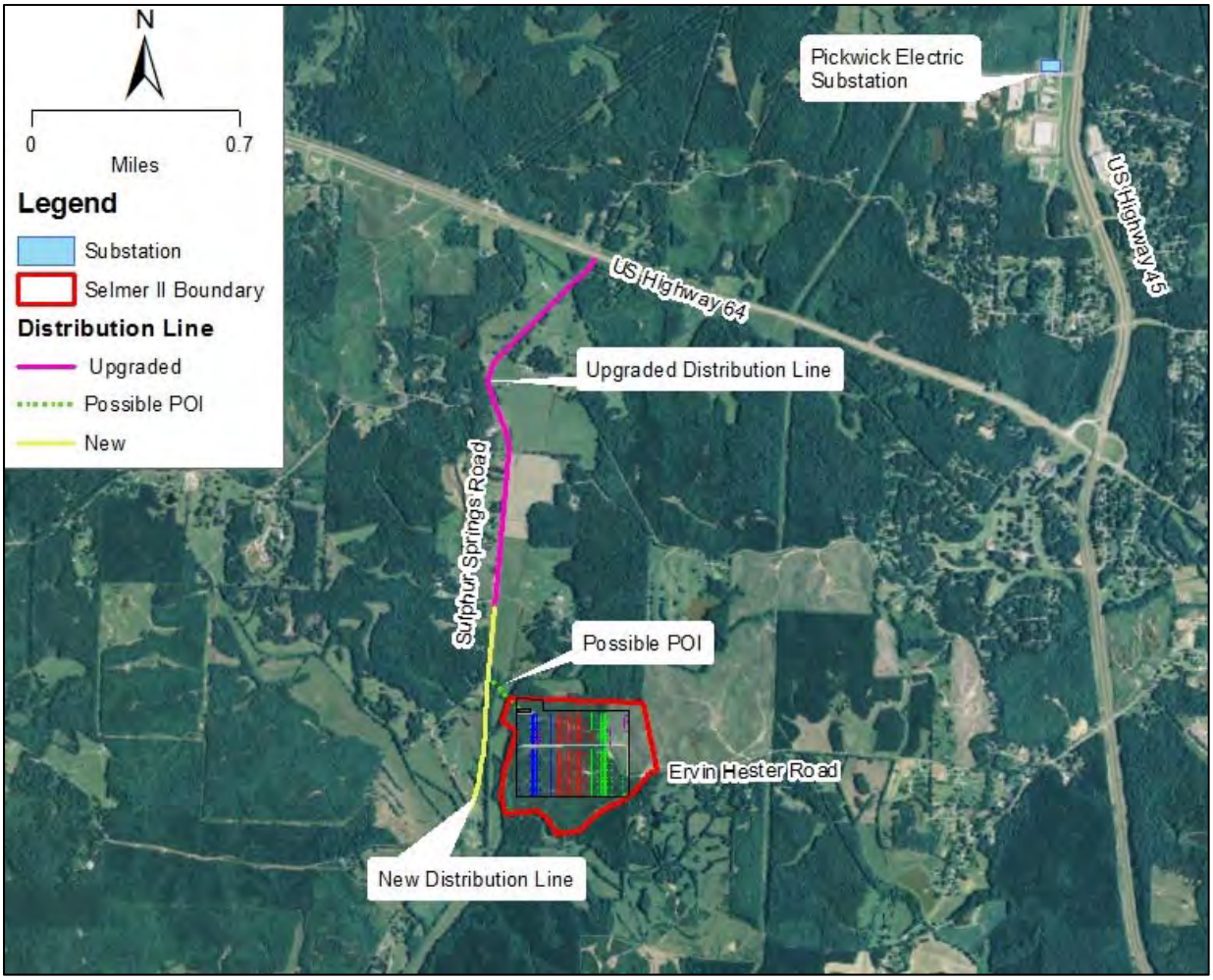

Figure 4. Locations of electrical lines connecting to the Pickwick Electric system.

2.2.3.1 Electrical Line Construction, Operation and Maintenance

The Proposed Action includes tying into existing Pickwick Electric distribution lines off site along Sulphur Springs Road. Distribution-related project features would be accessed using existing or proposed access roads and easements to the extent possible. Access roads would be needed to allow vehicular access to each structure. Typically, new permanent or temporary access roads are located in the existing right-of-way or easement wherever possible, and are designed to avoid severe slope conditions and to minimize stream crossings. The new Pickwick Electric distribution line would completely span streams near the project area and the poles would be mounted outside of any streams (Figures 8 and 9).

Periodic inspections of distribution lines would be the responsibility of Pickwick Electric. Routine maintenance activities include the removal, using mechanical cutting or herbicides, of trees or other vegetation that could interfere with the operation of the lines.

2.2.4 Project Operations

During operation of the Project, 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 one 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. Maintenance is required twice a year and for any equipment failures. No water, sewer, or lighting would be available on site during operations.

The facility would not be manned during operation; however, maintenance is required biannually and for equipment failures. Biannual inspections would include performing a site inspection to identify any physical damage or panels and wiring and physically inspecting all interconnection equipment and draw 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 an interval basis (every 2 to 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. Precipitation in this region is adequate to maintain panel energy production; therefore manual panel washing is not anticipated, unless a specific issue is identified.

In addition to the periodic maintenance, the proposed project 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 the parent company 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 approved facility.

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. Subsequent, more site-specific screening reviewed 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.

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 McNairy County, Tennessee. The analysis of impacts in this EA is based on the current and potential future conditions on the property and within the surrounding region. A comparison of the impacts of the alternatives is provided in Table 1.

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 may become residential over the long term.	Minor direct adverse impacts. Land use on the project site would change from undeveloped and silviculture 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 24 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:** Minor temporary direct adverse impacts during construction with the use of BMPs. Potential minor beneficial impacts from reducing fertilizer and herbicide runoff entering surface waters. **Floodplain:** No direct or indirect impacts. **Wetlands:** No direct adverse impacts. Minor indirect impacts that would be minimized with the use of BMPs and buffers.
Biological Resources	No direct impacts anticipated. Potential indirect impacts if current human practices are discontinued.	**Vegetation:** Minor direct and indirect adverse impacts associated with the clearing of pine trees and other vegetation and site grading. **Wildlife:** Minor direct and indirect adverse impacts associated with displacement of wildlife during site clearing and grading and conversion of site to permanent grass-herbaceous vegetation cover. **Rare, Threatened & Endangered (T&E) Species:** No impacts to federally listed species, no adverse impacts 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.

Resource Area	Impacts from the No Action Alternative (status quo)	Impacts from Proposed Action Alternative
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 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.
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 McNairy County area
Environmental Justice	No direct or indirect impacts anticipated.	No direct or indirect impacts anticipated.

2.5 THE PREFERRED ALTERNATIVE

The TVA-preferred alternative for fulfilling the purpose and need for this project is the Proposed Action Alternative. Under this alternative, TVA would enter into the PPA with Selmer II North, LLC; SRC would then construct and operate the proposed 10-MW DC single-axis tracking PV solar power facility with the energy generated being sold to TVA under a 20-year PPA. The preferred alternative (Proposed Action Alternative) would produce 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 area and potential impacts to land use associated with the No Action and Proposed Action alternatives. The project area is located in McNairy County, Tennessee, approximately 1.5 miles west of the Selmer town limits (Figure 5).

3.1.1 Affected Environment

Land use is defined as the way people use and develop land, including uses such as undeveloped, agricultural, residential, and industrial. Many municipalities develop zoning ordinances and planning documents to control the direction of development and to keep similar land uses together. No zoning ordinance or other governmental regulation of development is present at the Selmer II project site. Areas in McNairy County are advised by the West Tennessee Region Local Planning Assistance Office (Department of Economic and Community Development Local Planning Assistance Office 2011). The closest town that has zoning is the town of Selmer, located approximately 1.5 mile east of the Selmer II site. Land use in the project area is not officially governed by a municipality. Images generated with the National Land Cover mapping tool show the project site as predominantly undeveloped, mixed forested land (Figure 5).

The Selmer II site is comprised of mostly pine plantation with high brush and shrubs. The site has been historically used as a pine plantation, and as such minor infrastructure such as the several dirt roads transverse the property, originating from Ervin Hester Road. The site consists of hilly terrain with animal trails and depressions across the site, and ranges in elevation from approximately 460 to 530 feet amsl. The forested western portion of the property (Figure 5) was cleared in 2007 and has recovered with dense pine forest and briar thickets. The eastern portion was cleared between 2010 and 2012 and now consists of open fields of tall grasses and briar thickets. An unmaintained road runs along the northern property line. Topography is highest on the eastern section of the project site, gradually decreasing in elevation towards the western and northern sections of the property. No structures are present on the Selmer II site. Properties immediately adjacent to the western and northern section of the Selmer II site are mostly cleared and appear to be used for hunting and limited agriculture and grazing areas. A barn is located in the southern portion of the property and there is evidence of hunting in the open areas surrounding the barn. The southeastern portion of the property is bordered by Ervin Hester Road, across from which are a residence, forested land, and pasture for cattle grazing. The eastern section of the Selmer II site is a continuation of the same cleared terrain on the site and was also cleared between 2010 and 2012.

The closest populated area is Selmer, Tennessee, a town with approximately 4,000 residents and the largest city in McNairy County (US Census Bureau [USCB] 2010).

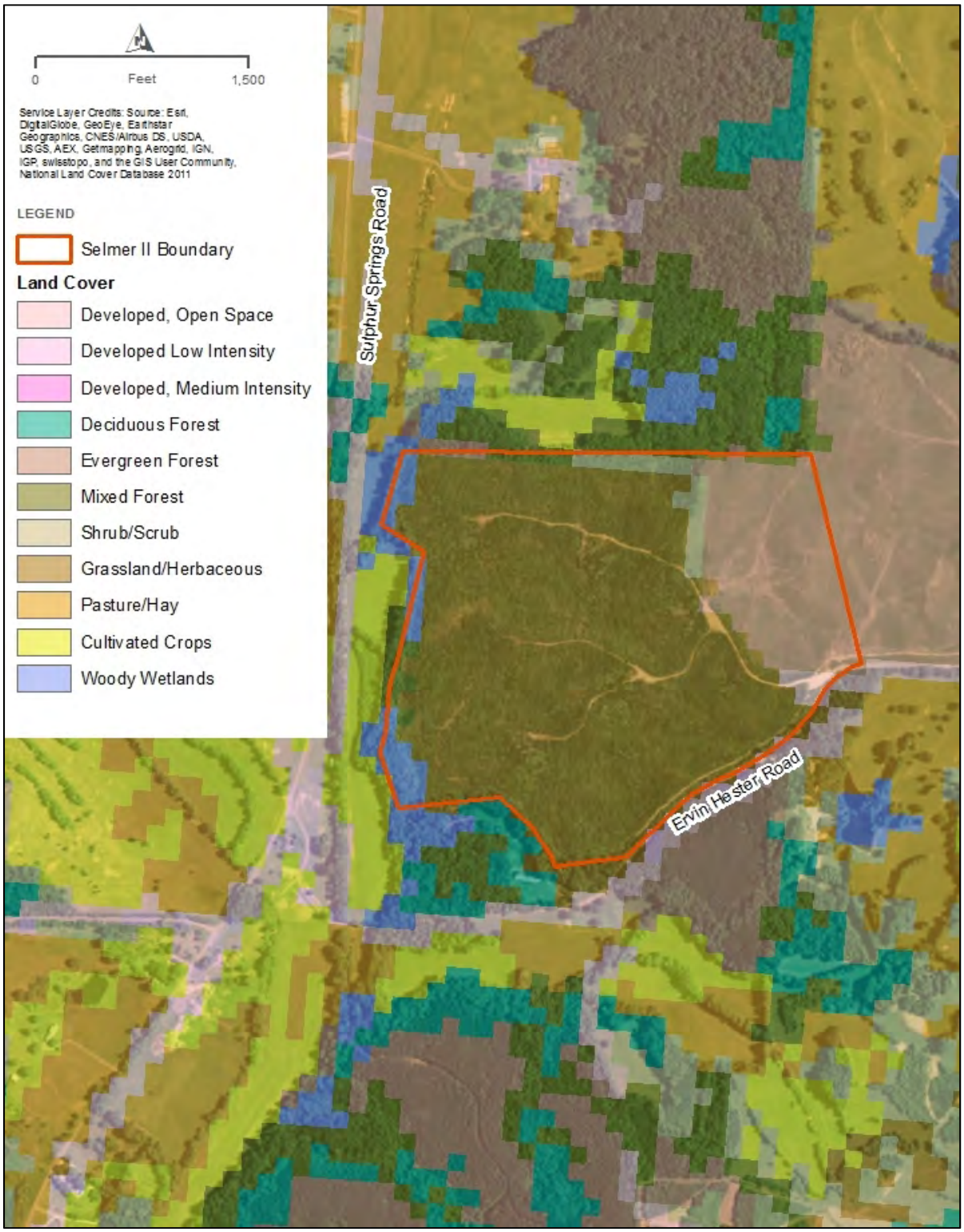

Figure 5. Land cover in the project area.

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 pine plantation and undeveloped land.

Indirect impacts to land use are possible as the town of Selmer grows. Over time, it is possible that the undeveloped areas in the project area could become developed if the resident population in the area grows significantly. Additionally, if the logging of the forested land is discontinued, the area would continue as undeveloped, mature forest, providing habitat to an increased diversity of species. Indirect impacts to land use are possible under the No Action Alternative as the undeveloped, immature forest may become residential over the long term.

3.1.2.2 Proposed Action Alternative

Under the Proposed Action, impacts to land use would occur. Land use on the project site would change from undeveloped to industrial. Although biologically sensitive areas would be avoided, the project site would have approximately 73 acres of development from solar arrays, roads, and other project infrastructure (Figures 3 and 4). Within the project site, certain aquatic features would be avoided, specifically wetlands.

The surrounding area is largely agricultural, undeveloped and sparsely residential, which is not likely to change significantly over the next 20 years. As a relatively small portion of a very large land use category in the project vicinity would be lost, this adverse impact would be minor overall. Following decommissioning of the solar farm, a large portion of the site could return to a mixed forest for timber or converted into agricultural or industrial use. The area of the project site owned by SRC, but not developed as a solar facility, is likely to remain agricultural and undeveloped on the western portion due to their proximity to wetlands and low-lying areas, with a possibility of residential development on the eastern portion. Overall the site is predicted to remain rural.

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. Components of geological resources that are analyzed include geology, paleontology, soils, and prime farmland.

3.2.1 Affected Environment

3.2.1.1 Geology

The project area is located in McNairy 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 area is in the East Gulf Coastal Plain section. 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. McNairy County in Western Tennessee is part of the Coon Creek Formation which is a geologic formation created from sandy marl deposits in the Late Cretaceous period. The typical fossil finds in McNairy County are Foraminiferan fossils which are small and common shelled protozoa found often in limestone deposits, although few vertebrates and mollusks have also been found (Coon Creek Science Center 2007). It is unknown if fossil remains are present within the project boundary.

3.2.1.3 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. Conditions do not exist on the proposed project area for a majority of these types of hazards. The Selmer II project area is located on relatively stable ground and no significant slopes are present within several miles of the site, therefore landslides are not a potential risk. There are no volcanoes within several hundred miles of the proposed project area.

Seismic activity in the project area 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 US Geological Survey (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 0.20g, for a PGA with a 2 percent probability of exceedance within 50 years (USGS 2008).

3.2.1.4 Soils

The majority of the soils in the project area are composed of Smithdale loam, 8 to 15 percent slopes, severely eroded, Smithdale loam, 12 to 25 percent slopes, severly eroded, Providences silty

clay loam 5 to 8 percent severely eroded, Udorthents, loamy, Enville fine sandy loam, Providence silt loam, and luka fine sandy loam (Figure 6). Of these, Providence silt loam and luka fine sandy loam are considered prime farmland (Figure 7).

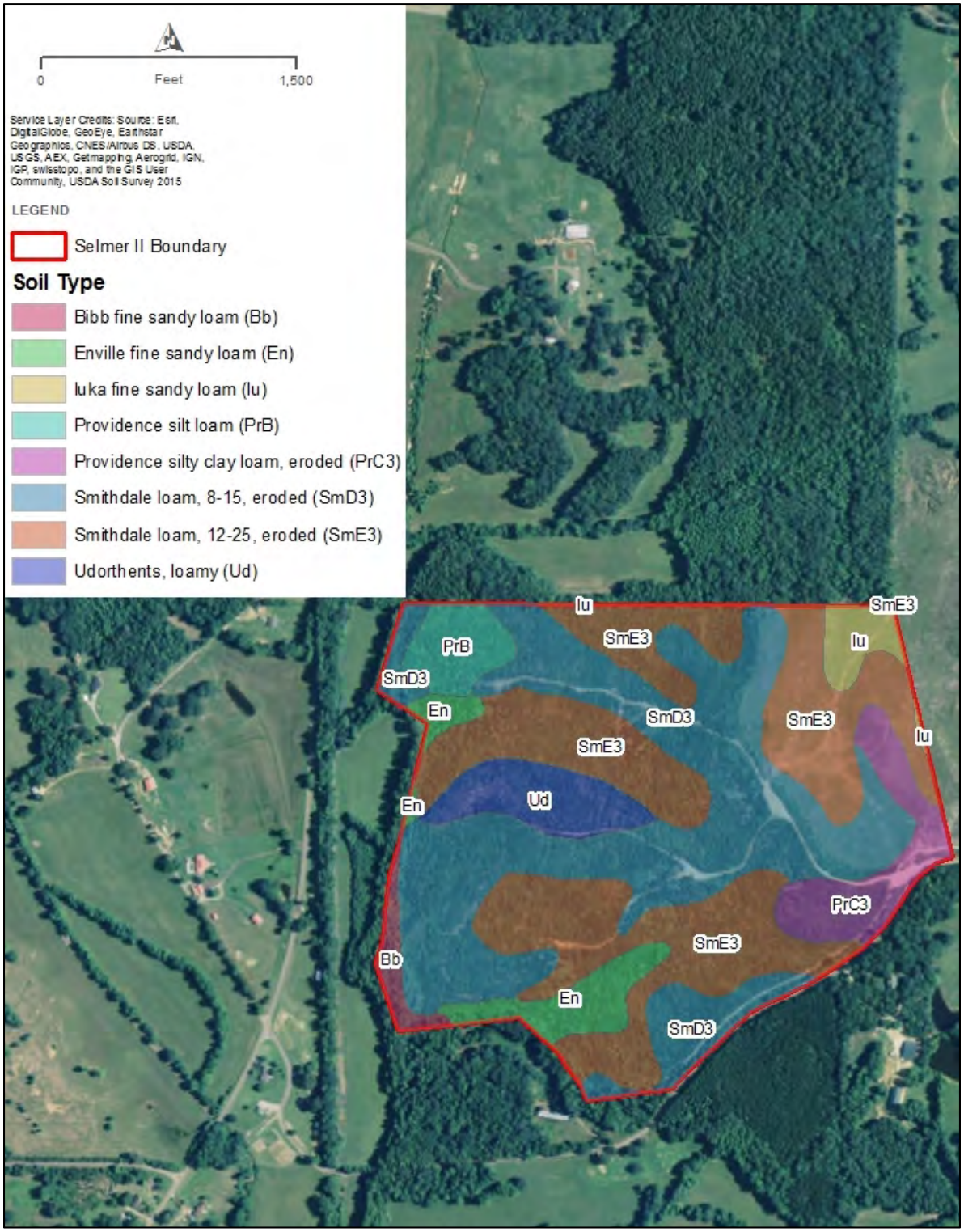

Figure 6. Soils on the project site.

Additionally, Smithdale loam, 8 to 15 percent slopes are listed on the National Hydric Soils List as having hydric inclusions. Smithdale series of soils are very deep, well-drained permeable soils which usually are found on ridge tops and hill slopes in dissected uplands of the Southern Coastal Plain and Western Coastal Plain and were formed in thick beds of loamy marine sediments. The first 1 to 2 inches of this series of soil are typically dark grayish brown, fine sandy loam with a weak fine granular structure and many roots from very fine to very coarse (Soil Series 2014a, USDA 2014). Providence soil series are moderately well drained with a fragipan and moderately slow permeability and formed in a mantle of silty materials and sandy and loamy sediments. These soils are found in uplands and stream terraces of the Southern Coastal Plain and the Southern Mississippi Valley Loess, typically in forested area with the top zero to three inches being a dark gray silt loam with a weak fine granular structure and many fine roots (Soil Series 2014b). Udorthents soil series are well-drained completely loamy soils (NRCS 2016). Enville series of soils are deep, poorly drained and moderately permeable soils located on floodplains formed in stratified loamy and sandy alluvium. The top eight inches are typically dark yellowish brown silt loam with a weak fine granular structure (Soil Series 2002).

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 project site contains eight soil types. The on-site soil type that is considered prime farmland in the project site is Providence silt loam loam and luka fine sandy loam. Table 2 provides a detailed description of all of the soil types located in the project site.

The location of prime farmland soils on the project site is identified on Figure 7. Based on information from the USDA NRCS, prime farmland soils occur on approximately 6.7 acres (5.7 percent) of the project site.

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 action on prime or unique farmlands. The purpose of the Act is “to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.”

Figure 7. Prime farmland classification of soils on the project site.

Table 2. Soils on the project site.

Soil type	Farmland classification	Hydric rating	Area (acres)	Percentage of site
Bibb fine sandy loam (Bb)	Not prime farmland	85	1.8	1.6
Enville fine sandy loam (En)	Not prime farmland	n/a	5.7	4.9
Luka fine sandy loam (Iu)	All areas are prime farmland	6	2.7	2.3
Providence silt loam (PrB)	All areas are prime farmland	n/a	4.0	3.4
Providence silty clay loam (PrC3)	Not prime farmland	n/a	7.3	6.3
Smithdale loam – 8 to 15% slopes (SmD3)	Not prime farmland	3	45.8	39.4
Smithdale loam – 12 to 25% slopes (SmE3)	Not prime farmland	n/a	42.7	36.8
Udorthents loam (Ud)	Not prime farmland	n/a	6.1	5.2
Total	**Prime farmland**		**6.7**	**5.7**

Source: NRCS 2016

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

Table 3. Farming statistics for McNairy County, Tennessee.

	Number of farms	Percentage of total area in farms	Land in farms (acres)	Average size of farms (acres)
McNairy County	658	36.0	129,982	198
Tennessee	68,050	41.2	10,867,812	160

Source: USDA 2012

3.2.2 Environmental Consequences

This section describes the potential impacts to geologic resources and prime farmlands should the Proposed Action or 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 pine plantation and undeveloped land.

Over time, indirect impacts to soils and geology could occur if the current land use practices are abandoned. If the site were to be developed, changes to the soils on site would occur due to increased erosion and runoff.

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. The majority of land in the project area would be cleared and/or lightly graded with the exception of areas associated with wetlands and areas inaccessible due to the presence of wetlands (Figures 10 and 11). Approximately 73 acres would be developed in the project area. 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 and paleontology could occur. No geotechnical evaluation of the project area 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 ponds 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 three feet deep. Additional minor excavations would be required for the medium voltage transformers associated with each PCS unit. Two or three power pole pads would be required to connect the arrays to the Pickwick Electric system. The poles would require some foundation work below the ground surface. Due to the small sizes of the subsurface disturbances, only minor direct impacts to potential subsurface geological and paleontological resources are anticipated.

As excavation would be limited, only minor direct impacts to geological and paleontological 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 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 probability for small to moderate intensity seismic activity and an unknown potential for sinkholes. Either seismic activity or sinkholes would likely only cause minor impacts to the project area 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 73 acres of the project area would be developed. The project area 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 layout plan was designed to impact the least amount of biologically sensitive areas as possible. Although not anticipated, should borrow material be required, small amounts of sand and gravel aggregate may be obtained either from on-site activities, or from local, off-site sources. The creation of new impervious surface, in the form of the panel footings and the foundations for the inverter station, would result in a minor increase in stormwater 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 one acre, a NPDES Permit for discharges of stormwater 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 stormwater 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 post-emergent 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 62 percent (73 acres) of the 117-acre project area would be covered with panels, roads, and project infrastructure and removed from potential farm use; this includes approximately 1.6 acres of prime farmland or approximately 24 percent of the total prime farmland soils at the project area.

The construction and operation of the solar facility would remove approximately 1.6 acres of prime farmland in the 117-acre project area from potential agricultural use. Furthermore, due to the presence of nonfarm development and urban support services in the immediate vicinity, the impacts would be limited to only the theoretical loss of “potential” farmland. Additionally, this type of solar facility is considered to be very “clean” due to the small footprint left if the facility were decommissioned. Therefore, the prime farmland could be reclaimed in the future for agricultural purposes with little long-term loss of soil productivity on most of the project area.

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. 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.

In accordance with FPPA evaluation procedures, a USDA Farmland Conversion Impact Rating Form (Form AD-1006) was completed for the 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 128 points for the project area. 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 area, 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 and/or timber production.

3.3 WATER RESOURCES

This section describes an overview of existing water resources in and surrounding the proposed project area in McNairy County, Tennessee and the potential impacts on these water resources that would be associated with the alternatives. Components of water resources that are analyzed include groundwater, surface water, and wetlands.

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 McNairy County is the McNairy-Nacatoch 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 McNairy-Nacatoch aquifer consists of sediments of Cretaceous age and is generally fine sand. Precipitation falling directly on surface outcrops of the aquifer units provides the primary water recharge for the McNairy-Nacatoch 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

runs 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 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).

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 creeks, streams, ditches, ponds, lakes, and wetlands. Surface waters with certain physical and hydrologic characteristics are considered Waters of the US (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 US under Sections 402, 404 and 401. The limits of Waters of the US are defined through a jurisdictional determination accepted by the USACE. State agencies have jurisdiction over water quality.

The proposed project area is located in the Lower Mississippi Watershed. The Lower Mississippi River begins at the junction of the Ohio River and Upper Mississippi River at Cairo, Illinois and runs to the Gulf of Mexico. No dams are located on the Lower Mississippi River and with a length of nearly 1,000 miles, the Lower Mississippi is the largest travelled section of the Mississippi River.

Within the Lower Mississippi Watershed, the project area is located within the Upper Hatchie Region, which primarily occupies Tennessee with parts of Kentucky and Mississippi and runs along the border with Missouri and Arkansas. The Upper Hatchie Watershed is largely made up of large tributaries that feed into the Mississippi River. Within the Upper Hatchie Watershed, there are 71 recognized waterbodies. All 71 waterbodies making up the watershed are rivers, of which 8 are considered to be impaired (USEPA 2012a).

On December 15, 2015 a wetland delineation and waterbody survey of the 117-acre project site was conducted. No streams or ponds occur on the site. Four wetlands were identified and mapped on the project site (Figures 10 and 11). Three of the wetlands are located in the southwestern corner and appear to feed into the nearby Mosses Creek. One isolated wetland is located along the

northern boundary. No waterbodies with special designations or listed impairments are present on or near the project area.

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. Executive Order (EO) 11988 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 (FEMA 2015).

The entire project area is in Zone X, an area outside of the 100- and 500-year flood zones, having less than a 0.2 percent chance of flooding annually. It is possible that minor, localized flooding could be associated with the four wetlands even though these features are not located within a mapped flood zone (FEMA 2008).

3.3.1.4 Wetlands

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. Wetland fringe areas also are found along the edges of most waterbodies and impounded waters (both natural and man-made). Wetlands with specific hydrologic, soil, and vegetation criteria are considered Waters of the US (or jurisdictional waters) and are under the regulatory jurisdiction of the USACE.

A desktop assessment using both the National Wetland Inventory (NWI) and the USEPA NEPAssist mapping tool was conducted to assess the project site for the presence of wetlands. The NWI and USEPA maps did not reveal any wetlands in the project area (Figures 8 and 9), however a map provided to HDR by SRC showed three previously delineated wetlands in the southwest corner of the project site.

The survey of the project site revealed four wetlands. The three previously mapped wetlands in the southwest corner of the property were confirmed and mapped. These three potential jurisdictional wetlands ultimately drain into Mosses Creek. An isolated wetland was identified inside the northern property line.

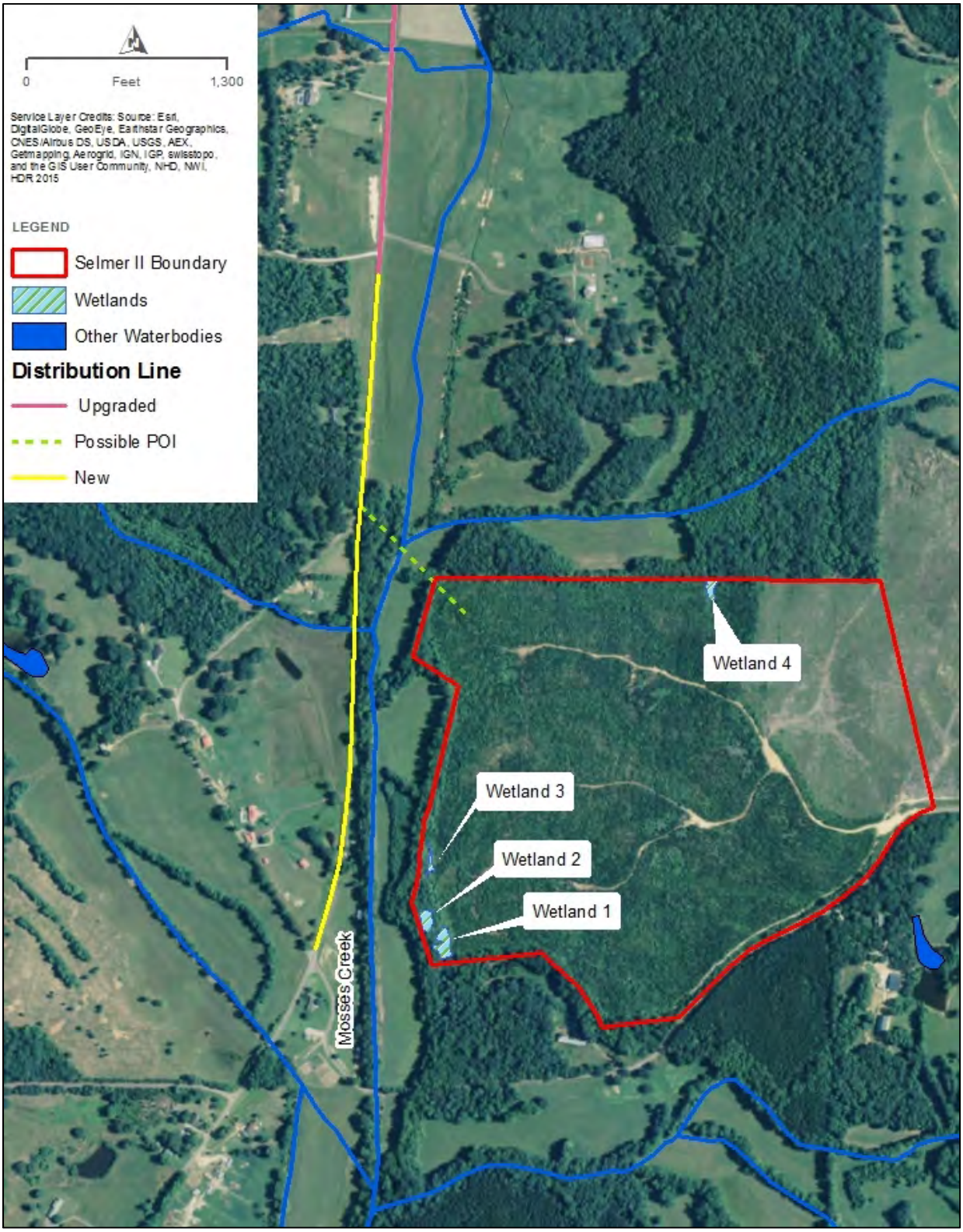

Figure 8. Aerial photograph showing wetlands and other waterbodies in the project area.

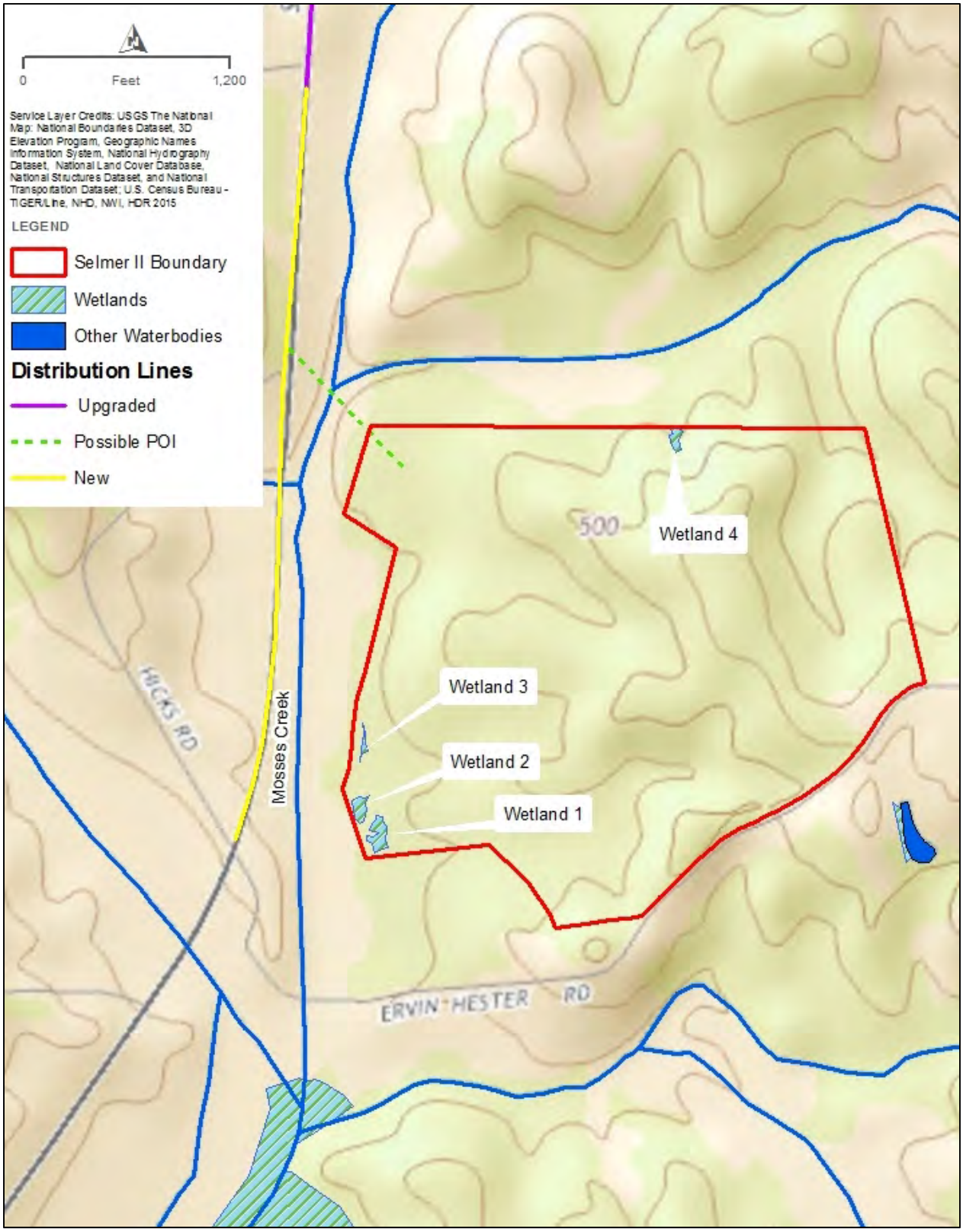

Figure 9. Topographic map showing wetlands and other waterbodies in the project area.

The first wetland (Wetland 1/W1) on the project site is the southernmost wetland in a series of three located in the southwestern section of the project site. The wetland is 0.23 acre and located within a wooded area containing hardwoods with sparse shrub and herbaceous layers. The ground was saturated and surface water was present in sporadic sections. The surrounding area is flat, but the wetland is slightly concave with small shallow slopes. Trees consist of American sweetgum (*Liquidambar styraciflua)*, red maple (*Acer rubrum)*, river birch (*Betula nigra*), yellow poplar (*Liriodendron tulipifera*), and American holly (*Ilex opaca*). Saplings and shrubs consist of American hornbeam (*Carpinus caroliniana*) and small American sweetgums. The herbaceous stratum is made up of common greenbrier (*Smilax rotundifolia)*, Christmas fern (*polystichum acrostichoides*), and eastern poison ivy (*Toxicodendron radicans)*, as well as Japanese honeysuckle (*Lonicera japonica*), an invasive species. Hydric soils were present with a loamy sand giving way to sand at lower depths.

Wetland 2 (W2) is located just north of W1. It has similar vegetation, soils, and hydrology characteristics as W1 though vegetation was sparser with fewer saplings, and also included black tupelo (*Nyssa sylvatica)* trees. This wetland consists of just over 0.15 acre.

The final wetland in the series of wetlands in the southwestern corner of the project site is the smallest and had similar soils and hydrology, minus drift deposits and water-stained leaves. At just under 0.5 acre, Wetland 3 (W3) consists primarily of shrubs and herbaceous plants. It maintains a similar tree canopy as the first wetlands, but with significantly thicker underbrush. In addition to the herbaceous vegetation seen in W1, sawtooth blackberry (*Rubus argutus*) and loblolly pine (*Pinus taeda*) were prominent. Each wetland is separated from the other through nonhydric soils, but ultimately they overflow and drain into the nearby Mosses Creek.

The fourth wetland (Wetland 4/W4) is located near the north-central boundary of the project site. The isolated wetland, approximately 0.10 acre in size, has surface water and water-stained leaves and consists primarily of shrub and herbaceous vegetation layers. It has few mature trees; only American sweetgum was seen, though a large number of loblolly pine (*Pinus taeda)* saplings were present. Whiskey grass (*Andropogon virginicus*), sawtooth blackberry, common greenbrier, soft rush (*Juncus effusus)* and sallow sedge (*Carex lurida)* make up the majority of cover and all were small enough to be classified as herbaceous plants. Since the wetland had no hydrologic connection to jurisdictional waters, it is considered an isolated, nonjurisdictional wetland.

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 solar facility 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 immature forest and undeveloped, 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 agricultural land. Increases in erosion and sediment runoff

could occur if forest management practices did not use 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.

3.3.2.2 Proposed Action Alternative

Groundwater

No adverse impacts to groundwater would be anticipated as a result of the Proposed Action. Once installed, the total surface area of PV panels would be approximately 61 acres of the project site. The elevated, tilted panels would cover roughly 52 percent of the project 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 not be used or stored at the site. However, 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.

<u>Construction-related Water Needs</u>

No water service is currently available at the proposed project area 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.

<u>Operation and Maintenance-related Water Needs</u>

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 expected to be low.

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.

<u>Decommissioning and Site Reclamation-related Water and Wastewater Needs</u>

Because conditions can change during the course of the project life, a final Decommissioning and Closure Plan would be submitted for review and approval 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 General Construction Stormwater NPDES Permit. The plan would include procedures to be followed during construction to prevent erosion and sedimentation, nonstormwater discharges, and contact between stormwater 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 withdrawal rate for West Tennessee of 244 Mgal/d (USGS 2000), 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 forested and undeveloped, which can help prevent runoff or erosion into nearby streams and wetlands. The construction and operation of the Proposed Action could eliminate the benefit that the forest and roots provide to reduce runoff or erosion; however, BMPs, including sedimentation basins and ditches during construction would be implemented to reduce runoff and erosion. Runoff and erosion is not expected post-development due to site stabilization including seeding and vegetation maintenance during site operation

Surface Water

The project area lacks any perennial surface water on site, although it contains four wetlands, three of which drain into Mosses Creek. The potential impacts to surface water would be minimized through the use of BMPs for controlling soil erosion and runoff, such as the installation of silt fences. During the panel layout process, care would be taken to avoid all streams and wetlands. The new Pickwick Electric distribution line along Sulphur Springs Road would completely span streams and the poles would be mounted outside of any streams. Additionally, construction of on-site stormwater 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 on the project site would be minor.

Subsequent reclearing to maintain easements would use similar methods. BMPs would be used throughout these processes to minimize any possible water quality impacts related to soil erosion. No changes to stream flows or the placement of existing water bodies are anticipated.

The project area may see increased runoff as it would require the clearing of a pine plantation. The volume of this increase would likely be low as vegetation would be reestablished and maintained on the site. Any increase in runoff is expected to have minimal off-site impacts with the use of BMPs during construction and facility operation.

Floodplains

Minimal grading and fill would be necessary to construct the Project, but no direct or indirect impacts to the floodplain are anticipated under the Proposed Action. The project area is located outside of the 100- and 500-year floodplains. Drainage patterns would not be sufficiently altered by the construction of solar panels on the project site to change the flood classification of the property, especially with the avoidance of all jurisdictional features. Additionally, the amount of potential fill required to grade the site should not impact any adjacent properties with respect to flooding frequency or intensity. Therefore, impacts to floodplains associated with construction and operation of the Proposed Action are not anticipated and the Proposed Action is consistent with the requirements of EO, 11988, Floodplain Management.

Wetlands

Under the Proposed Action, impacts to wetlands would be minimized as the site layout for the project area was designed to avoid all four wetlands on the site. Throughout the Project, BMPs (e.g., silt fences, hand-clearing of vegetation, etc.) would be implemented to minimize any soil disturbance near on-site wetlands.

Vegetation in the project area would be cleared using mechanized equipment. This activity would not impact the overall hydrology of the site. Minor impacts could occur through soil erosion and runoff from the surrounding areas; however, those impacts would be minimized through the use of BMPs as described above. No impacts to wetlands would be anticipated as a result of construction and operation of the solar facility. The action is consistent with the requirements of E.O. 11990, Protection of Wetlands.

Due to the avoidance of wetlands, the minimal impacts to streams, the use of BMPs to prevent sedimentation, and the relatively low quality of the wetlands and streams on site, impacts to on-site wetlands and nearby streams would be insignificant.

A Jurisdictional Determination and Nationwide Permit submittal to the USACE are not required because jurisdictional features in the project area would be avoided.

3.4 BIOLOGICAL RESOURCES

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

The Project is located in McNairy County, Tennessee near the town of Selmer, within the Upper Hatchie River watershed. This area lies within the Southeastern Plains Level III Ecoregion and contains five Level IV subecoregions. The Project is located within the Southeastern Plains and

Hills subecoregion. The Southeastern Plains are characterized by a mosaic of cropland, pasture, woodland, and oak-hickory-pine forest. The subecoregion contains several north-south trending bands of sand and clay formations. This area contains rolling topography and more relief than the Mississippi Valley floodplains to the west. Streams in this area have generally sandy substrates. The natural vegetation type is oak-hickory forest, transitioning into oak-hickory-pine to the southern portion of the subecoregion near the Project (Griffith et al. 1998). The temperature in the Southeastern Plains during January ranges between 26 and 47 degrees Fahrenheit; during July temperatures range between 67 and 90 degrees Fahrenheit (Griffith 1998). The area experiences an average of 50 inches of precipitation per year (Griffith 1998).

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 in December 2015. The results of the 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);
- The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712); and
- The Bald and Golden Eagle Protection Act.

Desktop research with the Tennessee Wildlife Resources Agency (TWRA) and the US 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 McNairy. USFWS must be consulted during the planning stages of a project with a federal nexus and the potential to affect T&E species. 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 area include vegetation and wildlife, as well as potential for rare, threatened, or endangered species.

3.4.1.1 Vegetation

The southern portion of the Southeastern Plains and Hills subecoregion is typically characterized by oak-hickory-pine forests. These forests are characterized by a broad diversity of trees, including northern red oak, pignut hickory, white oak, and mockernut hickory. Vegetation on the Project site has been altered from this typical forest community. The project area is primarily used as a timber farm with young loblolly pines throughout. The predominant species in the project area was loblolly pines with grasses and blackberry present in clearings. The vegetation in the wetland areas is described above in Section 3.3.1.4.

The biological survey was conducted during winter months which prohibited full identification of all plants on site.

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 (USFWS 2007). Other common mammals that may occur within the ecoregion include white-tailed deer and raccoons. Game birds in the region include the turkey. Common songbirds are the rose-breasted grosbeak during migratory periods, ovenbirds, blue jays, and summer tanager (USFWS 2007).

In addition to the above mentioned species, the young pine plantations offers a wide range of habitat for bird species such as the northern bobwhite, yellow-breasted chat, prairie warbler, common yellowthroat, field sparrow and indigo bunting. Mammals such as eastern cottontail rabbits, and various species of mice, shrew and voles are common. Reptiles and amphibians are more common in mature forest stands, which are not in the project area (Clemson Department of Forest Resources 1997).

Migratory Birds

The USFWS IPaC report identified 19 species of migratory birds of concern (i.e., birds of conservation concern are species not already federally listed that represent the USFWS's highest conservation priorities) that have the potential to occur in the vicinity of the proposed project area. These species are listed in Table 4. The project area generally does not provide suitable habitat for most of these species. As noted in Section 3.4.1.3, the majority of sparrows, warblers, and wren may have potential for habitat in and around the wetlands, but the proposed Project would avoid these areas creating minimal impact on the birds. With very few dead or dying trees in the project area, birds such as the red-headed woodpecker would similarly be minimally affected. Birds that would be affected, either due to a loss of foraging or nesting areas, would find similar habitat nearby which would further minimize impact on the diversity of the area. Bachman's sparrow has potential nesting area in the dense brush which is found throughout the pine plantation on site. Most other species on the list require woodland, swamp, or marsh habitats that do not occur on site. The project area does not provide any mature trees or hardwoods and is predominantly young pine with heavy underbrush. No large bodies of water are present near the project area and therefore it is unlikely that the bald eagle would be found in or around the project area. During the winter, the open, grassy fields are likely to be used by blackbirds, and while a blackbird was spotted, it was not likely a rusty blackbird due to the size and lack of coloring.

Table 4. Migratory bird species of concern potentially occurring in the vicinity of the project area.

Species name	Seasonal occurrence in project area
American kestrel (*Falco sparverius paulus)*	Year-round
Bachman's sparrow (*Aimophila aestivalis)*	Breeding
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
Least bittern (*Ixobrychus exilis)*	Breeding
Loggerhead shrike (*Lanius ludovicianus)*	Year-round
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
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 above). Desktop research with the TWRA and USFWS revealed two federally listed endangered species and one federally listed threatened species in McNairy County, Tennessee. Additionally, ten plant species, three crustacean species, and three bird species are listed as threatened or endangered and protected by the State of Tennessee. It is unlawful to take, capture or kill any of these species (TWRA 2015).

Federally Listed Species

A desktop database search and aerial/street-view photograph review was conducted to identify the types of habitats present in the project area, including habitats that potentially could support listed species. A survey of biological resources in the project area was conducted December 15, 2015. 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 to occur on either of the site. This section summarizes the evaluation of those biological resources that potentially may constrain development of the proposed Selmer II facility.

The federally listed species that were identified as having the potential to occur in the area are the whorled sunflower (*Helianthus verticillatus)*, Indiana bat (*Myotis sodalis)*, and the northern long-eared bat (*Myotis septentrionalis)*. No designated critical habitats are present in the project area (USFWS 2015a).

Indiana bat

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 2015b). The Indiana bat typically forages in semiopen forested habitats and forest edges as well as riparian areas along river and lake shorelines (USFWS 2015b, NatureServe Explorer 2016). Suitable summer roosting habitat requires dead, dying, or living trees over five 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. Caves which would provide wintering roosts are not present in the project area and trees in the project area, including along the proposed power line, are either too small or do not have exfoliating bark to provide suitable summer roosts (USFWS 2015e).

Northern long-eared bat

The range of the northern long-eared bat includes 39 states across much of the eastern and north-central United States. Its recent listing as federally threatened is based on the impacts from white-nose syndrome on a large proportion of the population, particularly in the northeastern United States. The northern long-eared bat spends the winter hibernating in caves. In summer, it roosts singly or in colonies in live or dead trees over five inches in diameter beneath bark, in cavities, or in crevices. It also has been found, though rarely, roosting in barns, sheds, or other structures. The northern long-eared bat forages for flying insects by flying through the understory of forested hillsides and ridges. Caves which would provide wintering roosts are not present in the project area and trees in the project area, including along the proposed power line, are either too small or do not have exfoliating bark to provide suitable summer roosts (USFWS 2015c).

Whorled Sunflower

The whorled sunflower is known only in four counties in the United States. It is a one to two meter tall perennial, herbaceous sunflower which inhabits remnant wet prairie areas and calcareous barrens, in moist, prairie-like openings in woodlands and along adjacent creeks (UFWS 2015d). The whorled sunflower blooms between August and October. Although no individuals were identified during the survey (in December 2015), this plant was at that time past its seasonal flowering stage;

thus identification would be difficult. Potentially suitable habitat for it on the project site is limited to the wetland areas.

State-Listed Species

State-listed animal species in Tennessee are assigned a legal listing status of state protected. The species in McNairy County that have a state status are shown in Table 5. These species include one of the federally listed species discussed above in addition to three birds, two crustaceans, and nine plants. In addition, there are 19 plant and animal species in the county that have a special concern or need of management status.

Table 5. State-listed species potentially occurring in McNairy County, Tennessee.

Scientific name	Common name	Federal status	State status	Habitat
Mammals				
Sorex longirostris	southeastern shrew	--	D	Various habitats including wet meadows, damp woods, and uplands; statewide.
Corynorhinus rafinesquii	Rafinesque's big-eared bat	--	D	Caves, hollow trees, abandoned buildings; often associated with forested areas.
Birds				
Anhinga anhinga	anhinga	--	D	Swamps, lakes, and sluggish streams at low elevations.
Thryomanes bewickii	Bewick's wren	--	E	Brushy areas, thickets and scrub in open country, open and riparian woodland.
Limnothlypis swainsonii	Swainson's warbler	--	D	Mature, rich, damp, deciduous floodplain and swamp forests.
Aimophila aestivalis	Bachman's sparrow	--	E	Dry open pine or oak woods; nests on the ground in dense cover.
Chondestes grammacus	lark sparrow	--	T	Open habitats with scattered bushes and trees, prairie, cultivated areas, fields with bushy borders; ground nester.
Reptiles				
Macrochelys temminckii	alligator snapping turtle	--	D	Slow moving, deep water of rivers, sloughs, oxbows, swamps, and lakes; middle and west Tennessee; obscure.

Scientific name	Common name	Federal status	State status	Habitat
Ophisaurus attenuatus longicaudus	eastern slender glass lizard	--	D	Dry upland areas including brushy, cut-over woodlands and grassy fields; nearly statewide but obscure; fossorial.
Amphibians				
Hyla gratiosa	barking treefrog	--	D	Low wet woods and swamps esp. with ephemeral ponds.
Fishes				
Noturus gladiator	piebald madtom	--	D	Large creeks & rivers in moderate-swift currents with clean sand or gravel substrates; Mississippi River tributaries.
Ammocrypta beani	naked sand darter	--	D	Shifting sand bottoms & sandy runs; Hatchie & Wolf rivers & their larger tributaries.
Ammocrypta vivax	scaly sand darter	--	D	Small to medium rivers with sandy substrate; Hatchie & Buffalo rivers.
Etheostoma cervus	Chickasaw darter	--	D	Small streams with slow to moderate current and predominantly sandy substrates; Forked Deer River watershed.
Crustaceans				
Orconectes wright	Hardin crayfish	--	E	Small-medium sized streams with cobble-sand substrates, under rocks or in leaf litter; western tributaries of the Tennessee River in Hardin and McNairy counties.
Fallicambarus hortoni	Hatchie burrowing crayfish	--	E	Primary burrower; uses saturated or seasonally saturated soils associated with perennial bodies of water; Mississippi River tributaries, Coastal Plain.
Insects				
Ophiogomphus howei	pygmy snaketail	--	--	Clear rivers with strong current over coarse cobbles and with periodic rapids; possible in Southern Appalachians.
Plants				
Silene ovata	ovate catchfly	--	E	Open oak woods
Ceratophyllum echinatum	prickly hornwort	--	S	Slow moving streams

Scientific name	Common name	Federal status	State status	Habitat
Stylisma humistrata	southern morning-glory	--	T	Dry piney woods
Drosera capillaris	pink sundew	--	T	Acidic wetlands
Magnolia virginiana	sweetbay magnolia	--	T	Forested acidic wetlands
Polygala mariana	Maryland milkwort	--	S	Sandy alluvial woods and disturbed areas
Polygonum arifolium	halberd-leaf tearthumb	--	T	Wetlands and marshes
Plantago cordata	heart-leaved plantain	--	E	Limestone creek beds
Cyperus plukenetii	Plukenet's galingale	--	S	Sandy barrens
Eleocharis tortilis	twisted spike-rush	--	S	Swamps
Fuirena squarrosa	hairy umbrella-sedge	--	S	Stream and lake margins
Sacciolepis striata	Gibbous panic-grass	--	S	Floodplains and shallow pools
Tridens flavus var. chapmanii	Chapman's redtop	--	E	Sandy Woods, roadside barrens
Platanthera cristata	yellow crested orchid	--	S	Acidic seeps and stream heads
Polytaenia nuttallii	prairie parsley	--	T	Prairies and open dry areas
Panax quinquefolius	American ginseng	--	S-CE	Rich woods
Helianthus verticillatus	whorled sunflower	E	E	Edge of creeks and fields
Symphyotrichum ericoides var. ericoides	white heath aster	--	E	Barrens

Status Abbreviations:
E – Endangered; T – Threatened; D – Deemed in Need of Management; CE – Commercially Exploited; S – Special Concern
Source:
Tennessee Department of Environment & Conservation National Heritage Program Rare Species by County

The project area does not contain suitable habitat for the majority of the state-listed species. The listed terrestrial species that could occur in the habitat types present on the site include one mammal, the southeastern shrew, and two birds, the Bewick's wren and the Bachman's sparrow. The project area provides suitable habitat for the Bewick's wren and Bachman's sparrow due to the dense thickets between the young pines. Unidentifiable wrens and sparrows were seen in the project area, but it is unlikely that these birds were Bewick's wren or Bachman's sparrow because they would not be expected to winter in Tennessee when the site visit was conducted. Areas of potential suitable habitat for the Bewick's wren and lark sparrow exist outside the project area on nearby properties. Potential habitat for the Bachman's sparrow may exist in the pine trees that would be cleared on site.

Four state-listed plant species have the potential to occur on the project area. The whorled sunflower (also a federally listed endangered species), prickly hornwort and hairy umbrella-sedge could occur along the western project boundary of the project area and the halber-leaf tearthumb has potential habitat in the wetlands on site. Of these, only the whorled sunflower is endangered,

but due to the frequent cultivation of the project area, the Project is unlikely to adversely affect the whorled sunflower.

3.4.2 Environmental Consequences

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

3.4.2.1 No Action Alternative

Vegetation

Under the No Action Alternative, there would be no direct impacts to the existing vegetation on the project site. It is assumed that the wooded areas on site would remain undeveloped and cleared every 15 to 30 years for pulpwood or longer if the pine was harvested for sawtimber. If these practices were discontinued, the project site would likely remain forested with a gradual shift from managed pine plantation to a mixed forest system which would resemble the surrounding areas and landscape.

Wildlife

Under the No Action Alternative, impacts to wildlife would be similar to those occurring to vegetation. If current practices continue, the pine plantation would continue to support wildlife that generally occurs in this habitat. If these current practices were abandoned, over time, the wildlife type would shift toward that which prefers mature forested areas. Therefore, there would be no direct impacts to wildlife, but possible indirect impacts could occur over time if existing human practices were abandoned.

Rare, Threatened, and Endangered Species

Under the No Action Alternative, no direct impacts to rare, threatened, and endangered species are anticipated. No habitats potentially supporting T&E would be disturbed or destroyed. However; as with vegetation and wildlife, indirectly, over time, shifts in habitat types caused by either the continuation or abandonment of human practices on project site could result in impacts to T&E. For example, a shift towards a more forested vegetative cover would make it more habitable for forested T&E species, such as bats, but whether these species would be found there in the future is unknown. Therefore, there would be no direct impacts to T&E under the No Action Alternative, but indirect impacts are possible, depending on human practices and the availability of T&E species to colonize the property.

3.4.2.2 Proposed Action Alternative

Vegetation

Under the Proposed Action, the proposed solar facility would be constructed in the project area with direct impacts to vegetation. Approximately 63.5 acres of immature pine trees less than 5 inches in diameter and approximately 9.5 acres of undeveloped land, comprised of primarily grasses, would

be cleared within the fenced-in area for the PV arrays, electrical components, and roads. This acreage does not include the wetland areas that would be avoided during the mobilization phase of construction. Following construction, the solar facility would be maintained as described in Section 2.2.4 to prevent vegetation from growing taller than about two feet. This would result in the long-term conversion of most of the project area from a pine plantation to a mix of grass and herbaceous vegetation. Installation of the arrays would require posts to be driven into the ground, and then subsequent trench and fill activities for the underground wiring. The trenches would be narrow and shallow, and revegetation would occur in these areas after construction.

The project area is currently functioning as a timber farm and the entire lot has the potential to be forested; therefore, the project area has a significant amount (approximately 63.5 acres) of forested acres that would be cleared. The areas surrounding the wetlands are the most biodiverse and would be avoided.

Taking into consideration the large amount of similar habitats in the area regionally and locally, the clearing and light grading of the existing vegetation of either site would be considered a minor impact. Most of the project area is pine plantation and undeveloped. As such, the pine trees are cleared and replanted. The surrounding area consists of very similar vegetative habitats and the conversion of 73 acres of 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. Overall, although much of the existing vegetation in the project area would be destroyed and converted to a new type of community, it would only constitute a minor impact due to the prevalence of similar habitats and ecosystems in the surrounding region.

Wildlife

Direct impacts to wildlife are also anticipated under the Proposed Action. Much of the wildlife living on the project site in areas which would be cleared, mowed and graded and converted to solar arrays would be displaced by construction activities. Following the completion of construction and site revegetation, some species adapted to grass and herbaceous fields such as field mice, common yellowthroat, and red-winged blackbird would likely reoccupy the site. A few species occupying the existing pine plantation and potentially inhabiting the proposed solar array habitat are likely to be similar. However, species such as yellow-breasted chat, indigo bunting, and prairie warbler would be displaced in this type of habitat due to the lack of shrubby and woody vegetation. Minor shifts in species composition may occur due to the change in disturbance regime and shift to periodically mowed grass and herbaceous fields. Species occupying the wooded areas would be permanently displaced. These wooded areas make up a very small portion of the forested habitat in the surrounding area. Overall, direct impacts to wildlife would be long-term and adverse, but given the prevalence of the affected habitat types in the project area, insignificant to regional populations.

Rare, Threatened and Endangered Species

Under the Proposed Action, no impacts to federally listed threatened or endangered species are anticipated. Suitable roost habitat for the Indiana and northern long-eared bats does not occur on

the project site. The wetlands in the project area providing potentially suitable habitat for the whorled sunflower, as well as a few state-listed species, would not be affected. A few other state-listed species could occupy old field and young pine plantation habitats on the site; given the prevalence of these habitats in the surrounding area, any impacts on these species would be insignificant.

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 Proposed Action and No Action Alternative.

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 illicit 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 near the town of Selmer. The regional character is mostly rural, with agricultural and pasture fields, rolling hills, forested areas, and generally small towns and communities. Attributes associated with the town of Selmer include many single-family homes with yards and trees, central roads with small shops and businesses, churches with grounds and social or athletic areas, and small single-lane roads leading into the more spread out residential areas and then on to the rural areas. The town is surrounded by rolling hills, farmland, and forests. Red soil gives way to green and brown fields.

Over half of the project site is heavily covered in young pine plantation which is to be harvested in the next several years (Photo 3). The underbrush is thick and full of blackberry thickets. No man-made buildings are on site, and the only evidence of human interaction on site is the clear-cutting of the northeast area, the logging roads, and several posts that mark intersections of the logging roads. These logging roads are impassable by most cars.

Photo 3. Typical vegetation covering the majority of the project site.

The project area has rolling hills with few wide open flatlands. The topography is such that the project site is one of the highest points in the surrounding area, yet the view is blocked by trees and thick vegetation as seen in Photo 3)

Slopes vary between steep and shallow grades, though there are very few flat areas the exception being the southwest corner where the majority of the wetlands are located (Photo 4). Tall, hardwood trees surround the project site with the exception of the eastern side. Because of the trees, nearby residents and travelers on Ervin Hester Road or Sulphur Springs Road would see little of the interior of the site.

Photo 4. Looking north from Wetland 1 in the southwest corner of the project site.

All of the project site is considered undeveloped, but timber harvesting is periodically carried out on site. The harvesting occurs in different areas at different times; areas that are clear cut at this time would be forested in 15 to 30 years, with the currently forested areas today being clear cut within the next decade. As such, the local residents are used to a changing landscape along with the heavy machinery and equipment associated with harvesting timber. An example of this can be seen in the northeast portion of the project site where timber was harvested in the last 5 years (Photo 5). Within several years, the vegetation seen in the photo would resemble the vegetation seen in Photo 3.

Photo 5. View looking northeast in the cleared portion of the project site.

Residences surrounding the project site are well hidden behind trees along their own property. This would further aid in protecting the local residents and travelers from any unwanted and changing views and would mitigate the effect of converting forested areas into a solar farm.

3.5.2 Environmental Consequences

This section describes the potential impacts to visual resources should the No Action or the Proposed Action 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 pine-dominated forest and fields. Impacts to visual resources are possible as the town of Selmer grows. Additionally, visual changes may occur over time as vegetation on the properties changes. If the trees are no longer harvested, vegetation would change from young pines to mature forest.

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 pine plantation, which has been actively managed for many years, to a commercial/industrial land use type. During the December 2015 site visit, the HDR field team assessed the potential for visual impacts from the Proposed Action on the project site.

The project site is not readily visible from surrounding properties and roads due to the mixed hardwood forest which runs along the border of the property. Panels would be visible from some residences, particularly during winter months after leaves have fallen in the hardwood forest. Due to the elevation of the project site, the panels would be visible but the contour hugging nature of the PV farm surrounded by the green trees left surrounding the property would create a mix of natural and manmade structures.

Visually speaking, the PV panels would be dramatically different from the current scenery on the site. Site wide, after construction of the Project, forested and open landscape would be replaced by industrial highly geometric patterns. The viewshed would change from a peaceful natural setting to a manufactured and structured appearance. Observers from the various viewpoints would most likely not experience the same aesthetic qualities that they currently do. The gently rolling landscape currently present would be replaced by the angular and geometrically arranged PV panels. Although the general topography of the project site would be maintained, the panels themselves would make the site look flatter. In the morning and evening, the top of the panels would be upright 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 on the north-south axis.

The construction of the proposed solar facility would create changes to the visible environment of the project area. During construction, heavy machinery would be present, changing the visual aspects of the project area, which is now an undeveloped landscape with immature pine trees, and few man-made features. Additionally, 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 a mixture of browns and grays due to earthmoving and concrete activities. Water would be used to keep soil from aerosolizing; therefore dust clouds are not anticipated. These visual impacts would be most noticed from Ervin Hester Road along the south and east site boundaries. The properties most likely affected by the Project are a house on the southern side of the project site that is across from the entrance to the site on Ervin Hester Road (Figure 10).

Indirect impacts to visual resources around the project site may occur due to increased traffic and movement of heavy machinery throughout both 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. Natural revegetation would be allowed to take place in and around the panels, new electrical lines would continue to be visible and dirt roads would be apparent throughout the solar facility. Chain-link security fencing topped with barbed wire would surround the panel arrays. Photos 6 and 7 show typical tracking solar panel arrays.

Photo 6. Single-axis, tracking photovoltaic system with panels close to maximum tilt as viewed from the east or west.

Photo 7. The back of the solar panels.

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 one mile away and the existing general local character. These impacts would be minimized, however, due to the sparsely populated immediate area and the trees maintained along most of the boundaries.

Figures 3 and 4 show the site layout including the solar panels and gravel access roads. The proposed solar facility would have no lighting during operation of the facility. Construction would generally take place during daylight hours, but some lighting may be needed during construction. Given that very few people would be expected to experience the view of these structures, and even then infrequently, adverse visual impacts associated with the PV panels would not be anticipated. The three on-site sedimentation basins would be constructed in the northwest corner, southwest corner, and south-central/southeast portion of the site. The basins in the northwest and southwest corners of the site would be largely obscured from nearby roads by trees. The basin in the south-central/southeast portion of the site may be visible from Ervin Hester Road. Views of it would be partially blocked by trees along the project boundary and it would appear as a pond surrounded by bushes in a clearing, with the panels in the distance. Overall visual impacts would be insignificant.

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 Proposed Action and No Action Alternative.

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, transportation, rural, and natural sounds such as wind and wildlife. Generally, noise levels in these types of areas range from 45 to 55 dBA.

Approximately 10 residences are within ½ mile of the project site (Figure 10). The closest occupied residence is approximately 285 feet from the proposed solar facility. Land use surrounding the

project area is primarily rural residential, agricultural, or undeveloped land with relatively few residences close to the project area.

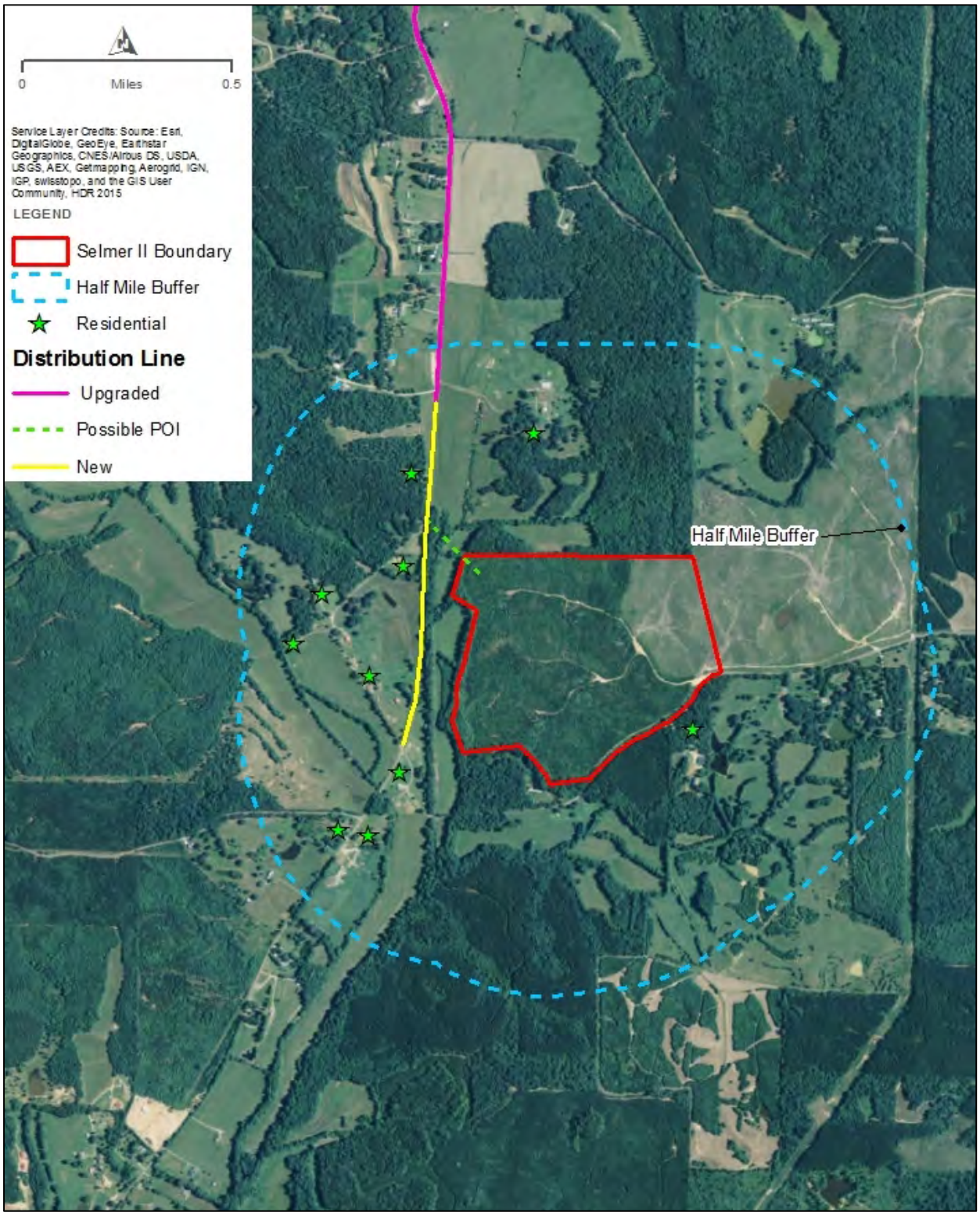

Figure 10. Sensitive noise receptors in the project area.

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 pine plantation and undeveloped 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 in the project area for 3 to 6 months.

Construction noise would cause temporary and short-term adverse impacts to the ambient sound environment around the project area. One sensitive receptor, a private residence across Ervin Hester Road, is adjacent to the project area approximately 285 feet from the southeast corner of the proposed solar arrays. The residence 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. Most of the proposed equipment would not be on site and operating 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 3 to 5 weeks. 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.

Existing ambient noise periodically includes tractors, other farm equipment, and public traffic. As construction would occur during the day, presumably when farm 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 logging and construction equipment with the exception of land and equipment maintenance. The moving parts 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.

Overall, implementation of the Proposed Action would be considered to have 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 farm.

3.7 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section describes an overview of existing air quality and GHG emissions within the project area and the potential impacts on air quality and GHG emissions that would be associated with the Proposed Action and No 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. The 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.

3.7.1.1 Regional Air Quality

McNairy County, Tennessee is in attainment for NAAQS pollutants by the USEPA as of January 2016 (USEPA 2015). 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 6. Not all Tier 1 sectors are measured in McNairy County. Those measured by the USEPA in 2011 include 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 (USEPA 2011).

Table 6. Average emissions of NAAQS pollutants in McNairy County during 2011.

Pollutant	Emissions (tons per year)
Carbon Monoxide	7191.4
Nitrogen Oxides	1265.2
PM_{10} Primary (Filt + Cond)	1393.6
$PM_{2.5}$ Primary (Filt + Cond)	547.6
Sulfur Dioxide	31.1
Volatile Organic Compounds	1511.5
Ammonia	145.2

Source: USEPA 2011

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 89 degrees Fahrenheit (F) and cool winters with average temperatures around 51 degrees F. The annual high temperature is around 71 degrees F and the annual low temperature is around 49 degrees F. Precipitation is highest from November through May. Precipitation averages 58 inches per year (US Climate Data 2016). Approximately 26 tornados occur, on average, throughout the Tennessee each year (National Oceanic and Atmospheric Administration [NOAA] 2015). Selmer area historical tornado activity is slightly higher than the Tennessee average and it is 91 percent greater than the overall US average (City Data 2015).

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 US 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 US (USEPA 2012b). McNairy County GHG emissions from 2011 are shown in Table 7. GHG emissions from the TVA power system are described in TVA (2015).

Table 7. Average emissions of GHGs in McNairy County during 2011.

Pollutant	Emissions (tons per year)
Carbon Dioxide	246,489.2
Methane	112.1
Nitrous Oxide	9.4

Source: USEPA 2011

3.7.2 Environmental Consequences

This section describes the potential impacts to climate and air quality should the Proposed Action 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 undeveloped land and pine plantation, and the existing habitat would be expected to remain as it is at present, with little effect on climate and air quality. The main sources of emissions in the project area would continue to be from internal combustion engines, burning of logging debris following timber harvest, and controlled burning of pine plantations.

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 debris from tree clearing on the site would occur. No burning of construction debris is anticipated. 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. If necessary, 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. The appropriate open burning permit would be obtained and weather conditions would be monitored and considered to ensure safety and minimal degradation to air quality during the open burning of the tree debris. 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. 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.

The removal of the pine trees in the project area would represent a minor loss of potential carbon sequestration potential and would constitute a minor adverse direct and indirect impact as sequestration would have continued for the life of the trees. 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 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. 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 (2015).

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 Proposed Action and No Action Alternative. Components of cultural resources that are analyzed include prehistoric and historic archaeological and architectural resources.

3.8.1 Affected Environment

3.8.1.1 Regulatory Background

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

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

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); and
4. Resolution of any adverse effects (by avoidance, minimization, or mitigation).

Throughout the process, the lead federal agency must consult with the appropriate State Historic Preservation Officer (SHPO), federally recognized American Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA review to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered by federal agencies. Generally these considerations 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.

3.8.1.2 Cultural Resources Identification Methods

As part of the evaluation process, an archaeological survey and a separate architectural survey were conducted in December 2015 and January 2016 conducted to determine the presence of prehistoric and historic cultural resources that are listed or eligible for listing in the NRHP (Franz and Reynolds 2016). The Section 106 review process commences with the delineation of the project's area of potential effect (APE). The 117-acre project site comprises the APE for cultural resources. Two APEs were defined for the Proposed Action: a direct effects APE and an indirect effects APE. The direct effects APE is defined as the area that would be directly affected by potential site construction, clearing, and operations. The direct effects APE overlaps with the project area and consists of the Selmer II 117-acre project site. The indirect effects APE is defined as an 0.5-mile radius surrounding the project site. The Selmer II tract and a 1-mile radius surrounding the tract were evaluated during background research. The cultural resources assessment for the direct and indirect effects APEs consisted of background research, field surveys, archaeological analysis, initial NRHP evaluations, and results summary.

Background research was conducted to identify any previously recorded cultural resources and historic properties, to establish the cultural setting in the project area vicinity, and to develop an effective method to newly identify cultural resources in the direct and indirect effects APEs. Field surveys were conducted in December 2015 and January 2016 to identify buried and aboveground cultural resources in the direct and indirect effects APEs. The archaeological field survey consisted of systematic surface and subsurface investigation of the direct effects APE. Findings of three or more artifacts within a 30-meter area were delineated and recorded as archaeological sites and registered with Tennessee Division of Archaeology. The architectural field survey consisted of documentation of each property 50 years of age or older, noting characteristics of design, construction, and other aspects of its architectural integrity needed to evaluate the property's eligibility for listing in the NRHP. Each property was photographed to the extent feasible from publicly accessible right-of-ways and documented on Tennessee Historical and Architectural Resource forms.

Recovered artifacts were processed, cleaned, cataloged, and analyzed in a fully-equipped archaeological laboratory. Using information compiled during background research, survey, and analysis, identified cultural resources were evaluated based on the four NRHP criteria, discussed above.

3.8.1.3 Cultural Setting

Archaeological sites spanning the entire period of human occupation in the Southeast are present in the project area vicinity, in western Tennessee. Archaeologists have developed several broad developmental stages characterizing human occupation for the central portion of the Mississippi River valley spanning the last 12,000 years. Paleoindian (approximately 11,500 to 9,900 Before Present [BP]), Archaic (approximately 9,900 to 3,000 BP), Woodland (approximately 3,000 to 1,000 BP), Mississippian (approximately 1,000 to 350 BP), and Historical (1542-ca. 1966 A.D.) comprise these stages, and sites from each of these have been identified in western Tennessee.

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 band social units with seasonal migrations relating to the movement of their large game prey, evidence of which exists in western Tennessee (Breitburg and Broster 1995; Brister et al. 1981; Williams 1954). Given a marked change in climatic conditions, late Paleoindian people altered their subsistence strategies to primarily depend on small game animals and gathered plant material. Subsistence during the Archaic stage shows more emphasis on gathering plants than before, as well as a gradual increase in population. Western Tennessee's data on the Archaic stage 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, including one mound, have been recorded in the project area vicinity. During this stage, the use of certain edible plants led to the semidomestication of some species, which progressed to full-scale agriculture by the end of the Woodland stage. 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 stage is marked by the shift to a new and improved ceramic clay body mixture. Settlements consisted of large towns in the floodplains of major river valleys, where inhabitants practiced agriculture, especially the growing of corn. 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).

Early settlers of western Tennessee came mostly from middle and eastern Tennessee as well as parts of North Carolina, South Carolina, and Virginia. The earliest pioneers settled on land granted by the state of North Carolina (Sease et al. 1989). Tennessee officially separated from North

Carolina and became a state in 1796. McNairy County, Tennessee, was established on 8 October 1823 (Wright 1882). The county was named for Judge John McNairy, who arrived in western Tennessee from Guilford County, North Carolina, after being appointed to the Superior Court of the Western District by President Washington. McNairy County was part of land ceded in 1818 in the Chickasaw Purchase. The first county seat was established at Purdy in the early 1820s. The first store in town was reliant upon Chickasaw customers, who traded fur and hides for various goods. The main crops produced in the county consisted of cotton, corn, oats, and wheat. In 1858, the Mobile and Ohio Railroad completed its line through McNairy County, running about 4 miles west of Purdy (Kennedy n.d.). Several new settlements emerged along the line as a result, including Falcon, Bethel Springs, Finger, Guys, and Ramer.

In August 1861, Tennessee ratified the Confederate Constitution and joined her sister states in the Civil War, a four-year struggle against the Union. Divided opinions on secession, however, led to the creation of both Confederate and Union companies in McNairy County (Whitten 2011). In February 1862, Ulysses Grant secured control of the Tennessee River from the Confederacy and opened up western Tennessee to Federal occupation (McKenzie 2001). Key skirmishes and battles occurred in Adamsville on April 1, 1862, and at Pittsburg Landing, south of Adamsville, on April 6, 1862. The latter, known as the Battle of Shiloh, was the bloodiest encounter in American history to that point, with nearly 24,000 casualties. Although suffering from many of these casualties, the Union was ultimately victorious following the heated battle that took place over a two day period (Connelly 1979). Despite such losses, Confederate resistance in western Tennessee resulted in numerous guerilla-type engagements, including those of Nathan Bedford Forrest throughout the war and at some points near the project area (Henry 1991).

While Purdy had remained the McNairy County seat since its inception in the 1820s, its citizens endured decades of attempts to move the seat after the town was bypassed by the railroad (Kennedy n.d.). Arguments for moving the seat increased following the Civil War. The stately brick courthouse at Purdy burned in 1881, with some historians suggesting that the cause may have been nefarious, and while it was never rebuilt, the town remained the county seat for the next 10 years. In 1891, the town of New South, along the railroad at the geographic center of McNairy County, was selected to be the new county seat and eventually became known as Selmer.

By the late nineteenth century, McNairy County residents focused once again on agricultural production, and cotton farming became the primary focus in the area through the early twentieth century. In 1880, western Tennessee produced over 80 percent of the state's cotton (Smith 1945). McNairy County has remained rural while enjoying fame as the home of Buford Pusser, the big-stick carrying sheriff immortalized in the 1973 film Walking Tall. McNairy County is now home to a number of industries, including United Stainless, Monogram Refrigeration, and a number of solar farms (Thomas 2014).

3.8.1.1 Background Research

Background research showed that no archaeological or architectural resources had been previously recorded either within the Selmer II tract or within 1 mile of the tract. No cultural resources listed or eligible for listing on the NRHP were identified within 1 mile of the project area.

Historical maps of McNairy County show that some of the existing, unimproved access roads were extant within the project area in the 1910s (Purdue 1916). One dwelling existed in the center of the tract, and another, immediately south of the tract. These dwellings remained relatively unchanged at least into the 1980s (USGS 1980).

Based on background research, the direct effects APE was considered to have a moderate probability for both prehistoric and historic archaeological resources and minimally contain isolated evidence of one former homestead. The indirect effects APE was expected to contain an inventory of mid-twentieth century architectural resources representative of residential housing development trends that occurred in McNairy County after WWII, when the county saw an increase in the local economy and development of rural areas beyond Selmer's downtown area. Increased availability of automobiles and improved road conditions allowed residents to live farther from their places of work, encouraging widely spaced residential development in rural settings.

3.8.1.2 Survey Results

One archaeological site was recorded during survey of the direct effects APE. The site was not recommended eligible for listing on the NRHP. More details on the survey results are provided below.

In the direct effects APE, 531 shovel tests were initially excavated along 26 north-to-south transects. One archaeological site, a late nineteenth to mid-twentieth century historical artifact scatter (40MY155), was identified, resulting in the excavation of additional shovel tests to delineate site boundaries. The site is located in the north-central portion of the tract. Based on background research, the dwelling formerly at 40MY155 was built prior to 1916 and seems to have been demolished or removed sometime after 1980 (Purdue 1916; USGS 1980). The surface collection of artifacts from this area suggests the site was in use minimally from the late nineteenth century. The demolition or removal of the dwelling likely corresponded with timbering of the tract. Currently, there is little evidence of site occupation except for the low density artifact scatter. No foundation elements are present, and building materials seem to have been removed offsite.

Late nineteenth- to mid-twentieth-century historic domestic artifact scatters are common throughout the Southeast and western Tennessee. The site was recently graded and disturbed by bulldozing activity. The overall disturbance of the site, lack of standing structures or surface features, and frequency of this site type suggests that 40MY155 has limited potential to contribute to our understanding of the history of McNairy County. Based on a preliminary assessment, 40MY155 is recommended not eligible for inclusion on the NRHP, and no further management consideration of the site is warranted (Franz and Reynolds 2016).

Seven newly identified architectural resources were identified within the indirect effects APE. Identified resources include a variety of early to mid-twentieth century architectural types and styles, including a large number of ranch houses and bungalows. None of these resources are recommended eligible for listing on the NRHP. More details on the survey results are provided below, and the indirect effects findings are summarized in Table 8.

Table 8. Historical architectural resources recorded in the indirect effects APE.

ID	Address	Date	Type or style	NRHP recommendation
1	approximately 1350 Ervin Hester Road	1950	Various agricultural outbuildings	Not eligible
2	2281 Sulphur Springs Road	1940	Bungalow	Not eligible
3	2261 Sulphur Springs Road	1965	Ranch	Not eligible
4	406 Hicks Road	1965	Neoclassical revival	Not eligible
5	71-A Hicks Road	1959	Ranch	Not eligible
6	71-B Hicks Road	1940	Bungalow	Not eligible
7	199 Forsyth Lane	1960	Ranch	Not eligible

Resource 1 is a collection of historic farm buildings. The property has the same owner as a house constructed in 1993 at 1350 Ervin Hester Road and is directly south of that address. The house associated with these outbuildings is no longer extant. There is a transverse crib barn, a small shed, and a storage building on the property, all constructed in circa 1950. The property is located south of Selmer, surrounded by agricultural fields.

Resource 2 faces east at 2281 Sulphur Springs Road, south of the town of Selmer. This is a circa-1940, wood-frame bungalow with a brick pier foundation with concrete block infill. The front-gable roof is clad in corrugated metal and features exposed rafter tails. The resource has weatherboard siding and a recessed panel, wood front door with a fixed window. The windows are wood-frame, flat-headed, and double-hung with three-over-one vertical pane configurations. The shed-roof front porch has a continuous concrete block foundation and a concrete slab floor. Two additions to the home are evident. Resource 2 sits in a small cluster of residential buildings, surrounded by agricultural fields.

Resource 3 is a circa-1965 ranch house at 2261 Sulphur Springs Road, south of Selmer. The wood-frame dwelling sits on a continuous concrete block foundation. The resource has a side-gable, asphalt-shingle roof with a projecting gable on the front-elevation. The dwelling has weatherboard siding, and the wood front door opens to a gable-roof, concrete slab stoop resting on a concrete block foundation. The double-hung windows have flat-headed wood frames with two-over-two horizontal pane configurations. The house has an integral single bay carport with decorative cast iron supports and a utility room. Alterations include storm windows and storm doors. The resource is situated within a small cluster of residential buildings, surrounded by agricultural fields.

Resource 4 faces east at 406 Hicks Road, south of Selmer. The two-story, side-gable, wood-frame house is a Neoclassical Revival with a Georgia plan, constructed in 1965 on a continuous concrete block foundation clad with brick veneer. The front elevation features double, wood-frame glass doors and a two-story temple front porch. Major alterations made circa 1985 resulted in replacement siding, windows, and columns. Resource 4 is set among agricultural fields.

Resource 5 faces east at 71-A Hicks Road, south of Selmer. This 1959, side-gable, wood-frame ranch house has a continuous concrete block foundation. The dwelling has a raised panel, wood front door and wood-frame, flat-headed, double-hung windows with two-over-two, horizontal pane configurations and decorative wood shutters. The shed-roof front porch has a continuous brick foundation, a concrete slab floor, and decorative cast iron supports. Circa-1980 alterations include storm windows and doors, vinyl roof soffits, vinyl siding in the porch gables, and a shed-roofed carport with wood post supports. Resource 5 is surrounded by agricultural fields, with widely-spaced residential buildings.

Resource 6 faces east at 71-B Hicks Road, south of Selmer. This wood-frame, front-gable bungalow was constructed in circa 1940 on a continuous concrete block foundation and features exposed rafter tails. The house has asbestos shingle siding and wood-frame, flat-headed, double-hung windows with four-over-four and six-over-six pane configurations. The hip-roof front porch has a continuous concrete block foundation, a wood plank floor, and wood post supports. Circa-1960 alterations resulted in an addition and replacement windows and front door. The dwelling is surrounded by agricultural fields, with widely-spaced residential buildings.

Resource 7 faces east at 199 Forsyth Lane, south of Selmer. The resource is a circa-1960, wood-frame, side-gable ranch house with a continuous concrete block foundation and is clad in brick veneer. There is a single raised panel, wood front door. The gable-roof front porch features weatherboard in the roof gable. The porch has a continuous brick foundation, a concrete slab floor, and decorative cast iron supports and railings. Circa-1970s and 1980s alterations resulted in replacement windows and the addition of a carport. Resource 7 is surrounded by agricultural fields, with widely-spaced residential buildings.

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 on the NRHP, either individually or as a district (Franz and Reynolds 2016).

3.8.2 Environmental Consequences

No cultural resources listed or eligible for listing on the NRHP were identified during background research or during field survey of the direct or indirect effects APEs. Given the extensive survey completed within the direct and indirect effects APEs, the potential for additional, unidentified cultural resources to be located is considered very low. Any undiscovered archaeological resources that may exist in the direct effects APE would likely be highly-disturbed, low density artifact scatters also ineligible for listing on the NRHP. TVA concurs with the recommendation in the cultural resources survey report that no historic properties would be affected by the construction and operation of the proposed solar facility and connecting power line (Franz and Reynolds 2016). TVA

is consulting with the Tennessee SHPO and federally recognized Indian tribes on this determination.

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 Proposed Action and No Action Alternative. Specific utility components analyzed below include electrical service, natural gas, and water supply.

3.9.1 Affected Environment

The Town of Selmer is the county seat of McNairy County and the source for the majority of the public services provided to the Project and adjacent areas. Public services include sanitary water, sewer, utilities (including natural gas and electricity) services, and solid waste disposal services, although all of the utilities may not extend outside of the town boundaries where either site is located.

3.9.1.1 Electrical Service

Electrical service is provided in the project area by Pickwick Electric through TVA. In addition, TVA is currently improving infrastructure along the northwest of the project area.

3.9.1.2 Natural Gas

Natural gas in the area is provided by Selmer Utility Division. No natural gas lines were observed on either project site.

3.9.1.3 Water Supply

No water supply, wastewater treatment system, or connections to the town of Selmer sewer are present on the project site.

No occupied residences are located on the property; therefore, there are currently no communication resources on the project area.

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 pine plantation and undeveloped 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, a new approximately 0.25-mile-long electrical line would be constructed from the solar facility to the existing 25-kV Pickwick Electric distribution line west of the project area. Upgrades to approximately 1.7 miles of existing Pickwick Electric line are also anticipated off site, as discussed in Section 2.2.3 Electrical service would be provided by Pickwick Electric to the Selmer II facility. Customers served by the 25-kV line would experience a short-term (approximately 1 hour) electrical outage and would be notified in advance of the outage. Pickwick Electric would build the new line with the old line active and transfer customers over to the new line. Therefore, only temporary, minor 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.

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 Proposed Action and No Action Alternative. 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 § 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 August 2015, as part of the property purchase process, a Phase I Environmental Site Assessment (ESA) was conducted on the project area to establish the presence, former use or spillage of hazardous substances or petroleum products. The ESA was conducted in the early project acquisition phase when the boundary of the project area was approximately 300 acres. Subsequently, SRC narrowed the project area down and purchased only the current 117-acre tract. Currently, land use in the project area is pine plantation and undeveloped. No evidence of recognized environmental conditions was found in the project area (Tioga 2015). HDR staff surveyed the project area in December 2015 and observed no waste-related environmental conditions, though there was evidence of heavy machinery in use in and around the project site, which could lead to petroleum and other hydrocarbon leaks and spillage.

The project area is located in unincorporated McNairy County. Solid waste in McNairy County is managed by the McNairy County Solid Waste Management Department through the McNairy County government offices. The McNairy County Landfill, located at 770 Airport Road, processes nonhousehold items only and accepts tires at an additional cost.

McNairy County has two recycling centers open one day a week and only accepting drop-offs. Recyclable items include cardboard, paper, plastic, tin, computers, and rechargeable batteries (McNairy County 2015).

3.10.2 Environmental Consequences

This section describes the potential impacts to waste management should the Proposed Action 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 pine plantation 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 (Table 0). Under the Proposed Action it is anticipated that a total of approximately 55 gallons of hazardous waste would be generated for the duration of the construction. Approximately 2,100 cubic yards of nonhazardous solid wastes would be generated at the project site. 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, likely the McNairy County Landfill, in accordance with applicable laws, ordinances, regulations, and standards.

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 connex 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 used for development of the proposed Project would primarily include: liquids such as used oil, hydraulic fluid and other lubricants associated with construction equipment. Solar modules and structural steel/hardware would be the majority of the

on-site storage. Some electrical equipment would also be stored on-site prior to installation. Material Safety Data Sheets for all applicable materials present on site would be made readily available to on-site personnel.

Table 9. Summary of construction waste streams and management methods.

Waste stream and classification	Origin and composition	Estimated amount	Estimated frequency of generation	On-site treatment	Waste management method/off-site treatment
Construction waste–hazardous	Empty hazardous material containers	1 cubic yard per week (cy/wk)	Intermittent	None	Return to vendor or dispose at permitted hazardous waste disposal facility
Construction waste–hazardous	Used oil, hydraulic fluid, oily rags	<55 gallons	Intermittent	None	Recycle, remove to off-site disposal location
Construction waste–non hazardous	Steel, glass, plastic, wood/pallets, cardboard, paper	2,100 cy for duration	Intermittent	None	Recycle wherever possible, otherwise dispose to Class III landfill
Sanitary waste–nonhazardous	Portable chemical toilets–sanitary waste	<200 gallons/ /day	Periodically pumped to tanker truck by licensed contractors	None	Ship to sanitary wastewater treatment plant
Office waste–nonhazardous	Paper, aluminum, food	1 cy/week	Intermittent	None	Recycle or dispose to Class III landfill

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 a 3- to 4-week period during site grading. During the majority of the construction period, fuel would be stored on site in aboveground double-walled storage tanks with built-in containment. The volume of each individual tank would not exceed the 1,320 gallons, the threshold above which a Spill Prevention, Countermeasure and Control (SPCC) Plan may be required (40 CFR § 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.

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 substances such 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 during decommissioning would include substances such as: carbon dioxide, diesel fuel, hydraulic fuel and lube 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.

SRC (or its contractor) would obtain a hazardous waste generator identification number from the State of Tennessee prior to generating any hazardous waste. All spills would be reported to the agency. A sampling and cleanup report would be prepared and sent to the agency 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.

Information on universal wastes anticipated to be generated during Project construction is provided in Table 9. Universal wastes and unusable materials would be handled, stored, and managed per General Universal Waste requirements.

The operation of the solar facility is expected to generate small quantities of nonhazardous wastes and hazardous wastes. The types of waste and their estimated volumes are summarized in Table 10.

Table 10. 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–nonRCRA hazardous	Tracker drives, gears, hydraulic equipment	120 cubic centimeters (cc) x 369 trackers	Every 2 years	Accumulate for <90 days	Recycle/ dispose
Oily rags, oil absorbent, and oil filters–nonRCRA hazardous	Various	One 55-gallon drum	Every year	Accumulate for <90 days	Sent off site for recovery or disposed at Class I landfill
Spent batteries–hazardous	Lead acid/lithium ion	744	Every 10 years	Accumulate for <90 days	Recycle

Wastewater

Portable chemical toilets would be provided for construction workers in the solar fields. 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 Proposed Action. 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 area is currently private property owned by SRC. Land uses on the project site are primarily mixed pine plantation and undeveloped. Since the land occupied by the project site is not used by, or accessible to the general public, there are no current public health and safety issues.

Public emergency services in the area include a regional hospital, law enforcement services, and fire protection services. The Tennova Healthcare – McNairy Regional Hospital is located in the town of Selmer. Law enforcement services in the town of Selmer are provided by the Selmer Police Department; McNairy County law enforcement services are provided by the McNairy County Sheriff's Department. Both the police department headquarters and the Sheriff's office are located in Selmer. Fire protection services are provided by the McNairy County Fire Department and the Selmer Fire Department. The nearest fire station to the project site is located in Selmer on Industrial Park Road, approximately 4 miles and 7 minutes 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 Proposed Action 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 unused land/pine plantation 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 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 best practices 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 Ervin Hester Road near the project area, 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 each 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 Proposed Action and No Action Alternative. 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 site is bounded on the southeast by Ervin Hester Road; the entrance to the property is from Ervin Hester Road along existing logging roads (Figure 3). Ervin Hester Road is a two-lane paved road that begins at Sulphur Springs Road about 0.8 mile to the west and terminates at the intersection with Dancer Road to the east. From its intersection with Ervin Hester Road, Sulphur Springs Road provides relatively straight, direct access to US Highway 64 on the west side of Selmer. Towards the east, Ervin Hester Road and a short stretch of New Bethel Road connect with the US Highway 64 S bypass about 1.7 miles from the project site.

3.12.1.2 Traffic

Existing traffic volumes were determined using Average Annual Daily Traffic (AADT) counts measured at existing Tennessee Department of Transportation (TDOT) stations. Traffic data was not available for any roads in the immediate vicinity of the project area, although the closest observation stations were located approximately 2 miles away on Hines Gin Road. The AADT on Hines Gin Road was 477 vehicles at station 089 and 324 vehicles at station 104, two miles south of Ervin Hester Road on Dunaway Road (TDOT 2016a). The county roads around the project site support levels of traffic relatively typical for rural Tennessee.

3.12.1.3 Rail and Air Traffic

No rail lines are operating within 3 miles of the project area.

The closest major airport is the Memphis International Airport, in Memphis, Tennessee, approximately 100 miles west of the project site. The closest regional airport is the Robert Sibley Airport located east of Selmer in McNairy County, approximately 8 miles from the project site. The airport consists of two runways, running 165 degrees and 345 degrees. Direct approaches should not lead planes over the project area (Robert Sibley Airport 2015).

3.12.2 Environmental Consequences

This section describes the potential impacts to transportation resources should the Proposed Action 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 unused 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 would have no effect on operation of the airports in the region. The operation of the solar facility 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.

During construction of the proposed solar facility, an average crew of approximately 50 to 100 workers would be present at the project site from approximately 7 am to 6:30 pm, 7 days a week, for approximately 3 to 5 months. 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 Selmer. 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. Workers and deliveries would access the project site from various directions on Ervin Hester Road. No major industries are located along Ervin Hester Road and a limited number of residences are present alongside the road in the vicinity of the project site. One residence is located on Ervin Hester Road (immediately to the south of the project area) that has the potential to be affected by construction traffic. Should traffic flow be a problem, SRC would consider staggered work shifts to space out the flow of traffic to and from the project site. SRC 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 approximately 15 semitractor trailer trucks or other large vehicles visiting the project site per day during the construction periods. The project area 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.

Due to the project site's proximity to the town of Selmer, possible minor traffic impacts along TN 15 through the town of Selmer could occur as workers could potentially commute from Selmer. However, the proposed workforce would consist of a maximum of 150 employees for only part of the construction period; therefore, the addition of these vehicles to the existing traffic on TN 15 would be considered minor.

The solar facility is not manned during operation; however maintenance is required biannually and for equipment failures and would require minimal personnel. Therefore, the operation of the solar facility would not have an 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 Proposed Action and No Action Alternative. 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 central portion of McNairy County, Tennessee approximately 1½ miles west of the town of Selmer. The project area falls within Census Tract (CT) 9305 for socioeconomic resources (Figure 11).

3.13.2 Population

The population of McNairy County, as reported in the 2010 US Census of Population, is 26,075 and 4,396 of whom live in the town of Selmer (US Census Bureau [USCB] 2010). As projected by the State of Tennessee, the population of McNairy County would be about 27,412 by 2030 (USCB 2005). CT 9305, which contains the proposed project area has a population of 7,788 (USCB 2010a). Population trends and projections are presented in Table 11.

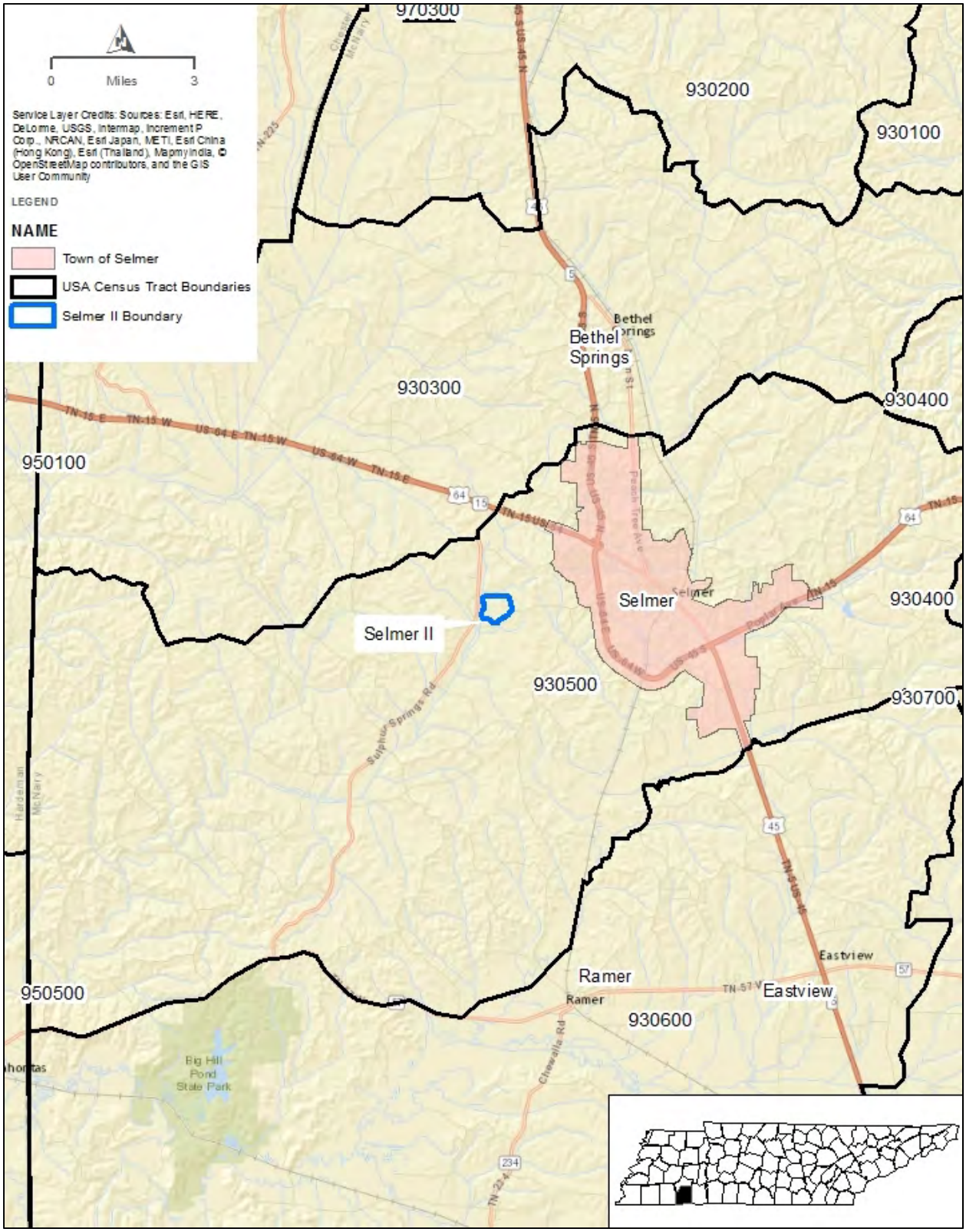

Figure 11. 2010 US Census tracts in McNairy County.

Table 11. 1990–2030 population data.

Area	1990	2000	2010	Projection 2030	Percent Increase 1990-2010	Percent Increase 2010-2030
McNairy County	22,422	24,710	26,075	27,412	16.3	5.1
CT 9305	7,264	7,788	7,748	NA	6.2	NA
Tennessee	4,877,185	6,346,105	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

Source: USCB 1990, USCB 2005

3.13.3 Employment and Income

McNairy County has a total employment of about 5,931 jobs (Table 12). Approximately 8.0 percent are employed in farming, above both the national level of 0.95 percent and the state level of 5.2 percent. Manufacturing provides 18.4 percent of the jobs, more than the national share of 10.4 percent, and the state share of 16.2 percent. Retail trade is slightly lower than the national share but higher than the state share of 7.0 percent, while government employment is higher than both the state share and the national share. The November 2015 unemployment rate for McNairy County was 8.0 percent; this represents a decrease of 1.2 percent from November 2014 (Federal Bank of St. Louis 2015).

Table 12. 2014 employment data.

Area	Total Employment	Percent Farm	Percent Manufacturing	Percent Retail Trade	Percent Government
McNairy County	5,391	8.0	18.4	11.5	22.9
Tennessee	2,835,895	5.2	16.2	7.0	11.6
United States	143,453,233	0.9	10.4	11.6	14.6

Source: US Bureau of Economic Analysis (BEA) n.d., Tennessee Dept. of Labor and Workforce Development 2014

Per capita personal income for McNairy County in 2014 was $27,774, which is less than the per capita income for the State of Tennessee of $40,457. McNairy County's per capita income is 60.3 percent of the national average and 68.7 percent of the state average (Table 13).

Table 13. 2014 per capita personal income data.

Area	Per capita personal income	Percent of US
McNairy County	27,774	60.3
Tennessee	40,457	87.9
United States	46,049	100.0

Source: BEA 2014b

3.13.4 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.

3.13.4.1 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 pine plantation and unused land and existing socioeconomic conditions would be expected to remain as they are at present.

3.13.4.2 Proposed Action Alternative

Under the Proposed Action, a new solar facility would be built in the project area. Construction at the proposed Selmer II solar facility would take approximately 3 to 5 months with an average crew of 50 to 100 workers employed for 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 7 am to 6:30 pm. 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 McNairy 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 could have minor beneficial indirect impacts to population and short-term employment and income levels in McNairy County and the Town of Selmer.

During operation of the solar facility, a temporary workforce of six to eight employees would be on site for mowing the properties every 2 to 3 months. One to two people would also be on site during biannual inspections of the solar facility. Grounds maintenance and other specific contracts for project operations would most likely be local and on quarterly to biannual basis. Therefore, operations of the solar facility would have a small positive impact on employment in McNairy 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 McNairy County area. Additionally, the local governments (McNairy County and Town of Selmer) 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 Proposed Action and No Action Alternative. Components of environmental justice that are analyzed include minority and low income population.

3.14.1 Affected Environment

Executive Order 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 EO, 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, US 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 southern part of McNairy County, near the town of Selmer. CT 9305, Block Group 2 which contains the proposed project area is identified as the impact area for environmental justice.

3.14.1.1 Minority Population

Minorities constitute 8.2 percent of the total population in McNairy County as of the 2010 US Census of Population (Table 14). CT 9305 has a minority population of 14.2 percent. Based on the table below, CT 9305 and the town of Selmer have a greater proportion of minorities than McNairy County. Block Group 2, which contains the proposed project area, has a lower percentage of minorities than its encompassing CT 9305, the town, and county. However, the levels for the block

group, CT, the town and the county are below the state of Tennessee (22.4 percent) and the national average (27.6 percent).

Table 14. 2010 minority population data.

Area	Total Population	Minority Population	Percent Minority Population
Block Group 2, CT 9305	1,471	239	16.3
CT 9505	7,788	1,107	14.2
Town of Selmer	4,396	797	18.2
McNairy County	26,075	2,150	8.2
Tennessee	6,346,105	1,424,157	22.4
United States	308,745,538	85,192,273	27.6

Source: USCB 2010a: Table DP-1: Profile of General Population and Housing Characteristics: 2010; USCB 2010b: Table P1: Race, 2010 Census Redistricting Data (Public Law 94-171) Summary File

3.14.2 Poverty

The estimated portion of the population in McNairy County that had income below the poverty level at the end of 2014 was 22.7 percent (Table 15). CT 9305 contained an estimated 23.6 percent of the population below the poverty level. CT 9305's estimated percent of the population below the poverty level is less than 1 percent above the county's estimated average. Therefore, CT 9305 would be considered to be a low-income community. The aforementioned CT's estimated percent of the population below the poverty level is above the estimated national level of 15.6 percent.

Table 15. 2014 estimated poverty level data.

Area	Total Population	Persons Below Poverty Level	Percent of Persons Below Poverty Level
Block Group 2, CT 9305	1,522	317	20.8
CT 9305	7,506	1,769	23.6
Town of Selmer	4,270	1,130	26.5
McNairy County	25,785	5,845	22.7
Tennessee	6,290,532	1,121,344	17.8
United States	306,226,394	47,755,606	15.6

Source: USCB 2014, Table B17021: Poverty Status of Individuals in the Past 12 Months by Living Arrangement; 2010-2014 American Community Survey 5-Year Estimates; FFIEC.

3.14.3 Environmental Consequences

This section describes the potential environmental justice impacts should the Proposed Action or No Action Alternative be implemented. Executive Order 12898 (59 FR 7629) directs federal agencies to identify and address, as appropriate, potential disproportionately high and adverse human health or environmental impacts on minority and low-income populations. 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 tract containing the project site are not considered a minority population but can be considered a low-income community. 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 Action in the McNairy County, Tennessee area was conducted. Resources examined included:

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

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

4.1 FEDERAL PROJECTS

This section addresses other projects with possible land use, water resources, visual, geological resources and farmlands, noise, and air quality impacts. Four federal projects are in the vicinity of the project area. The first is the US 64/State Route 15 project, which is part of the National Highway System. The TDOT roadway widening project stretches across ten southern Tennessee counties between Memphis and I-24, spanning over 260 miles and was separated into multiple projects. US 64 crosses through the town of Selmer and is approximately 1½ miles north of the project area. The roadway improvements have been completed in four counties, including McNairy County near the project area (TDOT 2016b).

The other three projects are solar farms. Two 20-MW solar farms are currently operating in the area: Selmer Solar Farm, located about 4 miles southeast of the Selmer II site and about 2 miles south of the town of Selmer, and Mulberry Solar Farm, located on the north side of TN 142, 5.4 miles east-southeast of the Selmer II site and 1.7 miles southeast of the town of Selmer. Both facilities were constructed by Strata Solar and began operating in late 2014. Strata Solar subsequently sold the facilities to Constellation Energy for operation. The Mulberry and Selmer solar farms produce 30,000 MW-hours of electricity a year which TVA purchases under the terms of a 20-year PPA. The potential environmental impacts of constructing and operating these two solar farms is the subject of the 2013 EA issued by TVA (TVA 2013).

SRC proposes to construct the 20-MW Selmer I Solar Project on a 231-acre site 4½ miles southeast of the Selmer II site and approximately 2 miles south of the town of Selmer. The proposed Selmer I facility would be developed on currently farmed agricultural land. This PV solar facility would be very similar to the Selmer II facility. The potential environmental impacts of constructing and operating the proposed Selmer I facility are currently being evaluated and are expected to be generally similar to those of the Selmer II facility. Construction of the Selmer I facility is scheduled to begin in 2016. TVA would purchase the electricity generated from the facility under the terms of a 20-year PPA.

These current and proposed projects have the potential to contribute to cumulative impacts on land use in the area. The solar farms would change the land use in the area from agricultural, undeveloped, and pine plantation to industrial. Given the high proportion of the county in agricultural and forestry land use and small proportion in industrial land use, this cumulative impact would be small. The development of solar energy in McNairy County is bringing a new industry around the town of Selmer. Owners of cotton fields, pine plantations, and other agricultural areas are offered potentially new uses that can help offset losses due to falling crop prices. The construction and maintenance of the solar farms would bring jobs and business to the area.

4.2 STATE AND LOCAL PROJECTS

No state or locally funded projects are in the vicinity of the project area with the potential to contribute to cumulative impacts associated with the Proposed Action.

CHAPTER 5

5.0 LIST OF PREPARERS

The preparers of this environmental assessment are listed below.

Name/Education	Experience	Project Role
TVA		
Charles P. Nicholson Ph.D., Ecology and Evolutionary Biology; M.S., Wildlife Management; B.S., Wildlife and Fisheries Science	36 years in zoology, endangered species studies, and NEPA compliance	NEPA Compliance and Document Preparation
W. Richard Yarnell B.S., Environmental Health	40 years in cultural resource management	Cultural resources, NHPA Section 106 compliance
Stephen C. Cole Ph.D., Anthropology; M.A. Anthropology; B.A. Anthropology	14 years in cultural resource management, 4 years teaching anthropology at university	Cultural resources, NHPA Section 106 compliance
HDR		
Renee Mulholland B.S., Marine Science; Masters of Earth and Environmental Resource Management (MEERM)	11 years in regulatory compliance, permitting, and NEPA documentation and project management	NEPA Project Manager, Document Preparation/Coordination and Document QA/QC
Benjamin Burdette, EIT M.S., Environmental Engineering	1 year in NEPA coordination and document preparation at the EA/EIS level	Environmental Planner, Document Preparation, GIS mapping, field work
Jason McMaster, PWS B.S., Business Administration; M.S., Environmental Science; M.A., Biology	8 years in combined regulatory compliance, preparation of environmental review documents, and project management	Environmental Scientist, Document Preparation
Harriet Richardson Seacat M.A. Anthropology	15 years conducting anthropological research relating to NHPA and NEPA compliance	Senior Ethnographer, Document Preparation/Cultural Resources

Blair Goodman Wade, ENV SP B.S., M.E.M.	11 years in regulatory compliance, NEPA documentation, and mitigation planning	Sr. Environmental Planner, Document QA/QC

CHAPTER 6

6.0 REFERENCES

Anderson, D. G., J. E. Foss, P. H. Garrow, and K. McRae. 1987. *Archaeological Survey Along the Obion River. Garrow & Associates, Inc., Atlanta, Georgia.* Report submitted to U.S. Army Corps of Engineers, Memphis District, Memphis, Tennessee.

Bauch, L. M. 1972. *Tennessee Historical Markers.* Tennessee Historical Commission, Nashville, Tennessee.

Blitz, J. H.1988. Adoption of the Bow in Prehistoric North America. *North American Archaeologist 9*: 123-145.

Breitburg, E., and J. B. Broster. 1995. *A Hunt For Big Game*. The Tennessee Conservationist Vol. LXI, No. 4.

Brister, R.C., J. Armon, and D.H. Dye. 1981.*American Mastodon Remains and Late Glacial Conditions at Nonconnah Creek, Memphis, Tennessee.* Memphis State University Anthropological Research Center Occasional Paper No. 10.

Bureau of Economic Analysis (BEA). 2014a. n.d. Regional Data. U.S. Dept. of Commerce. Accessed on 01/19/16 at: http://www.bea.gov/iTable/iTable.cfm?regid=70&step=1&isuri=1&acrdn=2#regid=70&step=10&isuri=1&7003=200&7035=-1&7004=naics&7005=-1&7006=47000&7036=-1&7001=1200&7002=1&7090=70&7007=2014&7093=levels.

_____. Local Area Personal Income: 2014b. U.S. Dept. of Commerce. (n.d.). Accessed on 01/21/16 at: http://www.bea.gov/newsreleases/regional/lapi/2015/pdf/lapi1115.pdf.

Childress, M.ll R. 1993. *Archaeological Survey and Testing in Northwestern Tennessee: Crockett, Dyer, Gibson, Haywood, Lake, Lauderdale, and Weakley Counties.* Garrow and Associates, Inc., Memphis, TN. Submitted to the U.S. Army Corps of Engineers, Memphis District, Memphis, TN.

Childress, M. R., and C. Wharey. 1996. Unit 4 Mound Excavations at the Chucalissa Site, 1960-1970. In *Mounds, Embankments, and Ceremonialism in the Mid-South*, edited by R.C. Mainfort and R. Walling, pp. 64-77. Arkansas Archaeological Survey Research Series No. 46, Fayetteville.

City Data.com. 2015. Selmer, Tennessee (TN) profile. Accessed on 01/14/2016 at: http://www.city-data.com/city/Selmer-Tennessee.html.

Clemson Department of Forest Resources. 1997. *Responses of Wildlife to Clearcutting and Associated Treatments in the Eastern United States*. Accessed on 03/27/2016 at http://www.clemson.edu/extension/natural_resources/wildlife/handbook/index.html.

Connelly, T. L. 1979. *Civil War Tennessee: Battles and Leaders.* University of Tennessee Press, Knoxville, Tennessee.

Coon Creek Science Center. The Fossils of Coon Creek 2007. Accessed on 01/14/2016 at: http://www.memphismuseums.org/layout_files/uploads/files/Coon%20Creek%20book%201st%20Half%20draft%20final.pdf.

Council on Environmental Quality (CEQ). 1997. Environmental Justice Guidance Under the National Environmental Policy Act. Available at: http://www3.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf.

Federal Financial Institutions Examination Council (FFIEC) Census Reports. 2016. Accessed on 01/19/2016 at: http://www.ffiec.gov/census/report.aspx?year=2000&state=47&msa=&county=109&tract=9906.00&report=population.

Federal Highway Administration (FHWA). 2016. FHWA Roadway Construction Noise Model User's Guide FHWA-HEP-05-054. Accessed on 02/23/2016 at: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf

Federal Register. 2014. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Physaria globosa (Short's bladderpod), Helianthus verticillatus (whorled sunflower), and Leavenworthia crassa (fleshy-fruit gladecress). Accessed on 01/12/2016 at: https://www.federalregister.gov/articles/2014/08/26/2014-19558/endangered-and-threatened-wildlife-and-plants-designation-of-critical-habitat-for-physaria-globosa.

Federal Reserve Bank of St. Louis. (n.d). Unemployment Rate in McNairy County, TN. Accessed on 01/19/2016 at: https://research.stlouisfed.org/fred2/series/TNMNURN.

Federal Emergency Management Agency (FEMA). FEMA Flood Map Service Center. 2008. Accessed on 12/31/2015 at: https://msc.fema.gov/portal.

_____. 2015. Executive Order 11988: Floodplain Management. Accessed on 01/21/2016 at: http://www.fema.gov/executive-order-11988-floodplain-management.

Franz, D. M., and W. M. Reynolds. 2016. Phase I Cultural Resources Survey of the Selmer I and Selmer II Solar Tracts. Brockington and Associates, Norcross, Georgina.

Griffith, G.E., J.M. Omernik, and S.H. Azevedo. 1998. Ecoregions of Tennessee. (2 sided color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, VA. Scale 1:940,000. http://archive.epa.gov/wed/ecoregions/web/html/tn_eco.html.

Henry, R. S. 1991. *Forrest: First with the Most*. Broadfoot Publishing Company, Wilmington, North Carolina.

Jennings, J. D. 1989. *Prehistory of North America.* Mayfield Publishing, Mountain View, California.

Kennedy, N. W. n.d. *The Death Song of Purdy.* Accessed on 01/12/2016 at: http://www.mcnairytnhistory.com/history.html.

LandScope America. 2016. East Gulf Coastal Plain. Accessed on 01/14/2016 at: http://www.landscope.org/explore/natural_geographies/ecoregions/East%20Gulf%20Coastal%20Plain/.

Lewis, T., and M. K. Lewis. 1961. *Eva: An Archaic Site*. University of Tennessee Press, Knoxville, Tennessee.

Mainfort, R. C., Jr. 1985. *An Archaeological Survey of Selected Localities within the Obion-Forked Deer Drainage, West Tennessee.* Tennessee Department of Conservation, Division of Archaeology, Nashville, TN. Submitted to the U.S. Army Corps of Engineers, Memphis District, Memphis, Tennessee.

McKenzie, R. T.. 2001. Civil War and Socioeconomic Change in the Upper South: The Survival of Local Agricultural Elites in Tennessee, 1850-1870. In *Tennessee History: The Land, the People, and the Culture*, edited by Carroll Van West, second edition. University of Tennessee Press, Knoxville, Tennessee.

McNairy County. 2015. Solid Waste Mgmt. Accessed on 2/23/2016 at: http://www.mcnairycountytn.com/solid_waste_mgmt.htm.

Muncy, J A. 2012*. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities, Revision 2.1.* Edited by A. Bowen et al. Tennessee Valley Authority, Chattanooga. Available at: http://www.tva.com/power/projects/bmp_manual_2012.pdf.

National Oceanic and Atmospheric Administration (NOAA). 2015. National Center for Environmental Information: Historical Records and Trends. Accessed on 02/23/2016 at: https://www.ncdc.noaa.gov/climate-information/extreme-events/us-tornado-climatology/trends.

NatureServe Explorer. 2016. *Helianthus verticillatus*. Accessed on 01/04/2016 at: http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=161308&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=161308&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=161308.

Natural Resource Conservation Service (NRCS). 2016. Custom Soil Resource Report for McNairy County, Tennessee. Accessed on 01/08/2016 at: http://websoilsurvey.sc.egov.usda.gov/WssProduct/op434unqucgyjd4sogzabitp/GN_00000/20160115_10090710311_65_Soil_Report.pdf.

Ornelas-Struve, C., and F. L. Coulter. 1982. *Memphis: 1800-1900, Vols. I-III.* Nancy Powers & Company, New York, New York.

Purdue, A.H. 1916. State of Tennessee Geological Survey. Map available at the Tennessee State Library and Archives, Nashville, Tennessee.

Robert Sibley Airport. 2015. Runway Information. Accessed on 01/05/2016 at: http://www.robertsibleyairport.com/runwayinfo.htm.

Sease, E.C., R.L. Flowers, W.C. Mangrum, and R.K. Moore. 1989. Soil Survey of Shelby County, Tennessee. U.S. Department of Agriculture, Soil Conservation Service, Washington D.C. (2nd printing).

Soil Series. 2002. Enville Series. Accessed on 01/14/2016 at: https://soilseries.sc.egov.usda.gov/OSD_Docs/E/ENVILLE.html.

_____. 2014a. Smithdale Series. Accessed on 01/14/2016 at: https://soilseries.sc.egov.usda.gov/OSD_Docs/S/SMITHDALE.html.

_____. 2014b. Providence Series. Accessed on 01/14/2016 at: https://soilseries.sc.egov.usda.gov/OSD_Docs/P/PROVIDENCE.html.

Smith, G. P. 1979. *Archaeological Surveys in the Obion-Forked Deer and Reelfoot-Indian Creek Drainages: 1966 through early 1975.* Anthropological Research Center Occasional Papers No. 9, Memphis State University, Memphis,TN.

_____. 1991. The Archaic Period in the Mississippi Drainage of Western Tennessee. In *The Archaic Period in the Mid South: Proceedings of the 1989 Mid-South Archaeological Conference,* edited by C. H. McNutt, pp.46-58. Mississippi Department of Archives and History Archaeological Report No. 24. Memphis State University, Anthropological Research Center Occasional Papers No. 16, Memphis, TN.

Smith, S. F. 1945. Post-Civil War Agriculture in West Tennessee. Unpublished Master's thesis, Vanderbilt University, Nashville, TN.

Department of Economic and Community Development Local Planning Assistance Office. 2011.Status of Planning & Land Use Controls. Accessed on 12/22/2015 at: https://www.gnrc.org/wp-content/uploads/2011/12/status-complete-2011.pdf.

Tennessee Department of Environment & Conservation (TDEC). Rare Species by County. Accessed on 01/03/2016 at: http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9014:3:0::NO.

Tennessee Department of Labor and Workforce Development. 2014. Tennessee's Quarterly Census of Employment and Wages Annual Averages for 2014. (n.d.). Accessed on January 19, 2016at: https://www.jobs4tn.gov/admin/gsipub/htmlarea/uploads/QCEW2014.pdf.

Tennessee Department of Transportation (TDOT). 2016a. Traffic History. Accessed on 01/05/2016 at: https://www.tdot.tn.gov/APPLICATIONS/traffichistory.

_____. 2016b. US 64/State Route 15. Accessed on 01/14/2016 at: https://www.tn.gov/tdot/topic/us-64-sr-15.

Tennessee Valley Authority (TVA). 1983. Procedures for Compliance with the National Environmental Policy Act. Accessed 02/23/2016 at: https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/tvanepa_procedures.pdf.

_____. 2011. Integrated Resource Plan, TVA's Environmental & Energy Future. Chattanooga, Tennessee.

_____. 2013. Final Environmental Assessment: Strata Solar Farm Project, McNairy County, Tennessee. Prepared for Tennessee Valley Authority, November 2013. Available at: http://152.87.4.98/environment/reports/strata/Strata_Solar_FEA_Ch1-2.pdf.

_____. 2014. TVA Solar Photovoltaic Projects Final Programmatic Environmental Assessment: Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. Prepared by Tennessee Valley Authority, Knoxville, Tennessee. Available at: https://www.tva.com/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/TVA%20Solar%20Photovoltaic%20Projects/PV-final%20PEA-Solar%20PV-reduced%20size.pdf, accessed 21 January 2014.

_____. 2015. Final 2015 Integrated Resource Plan and Final Supplemental Environmental Impact Statement. Available at: https://www.tva.com/Environment/Environmental-Stewardship/Integrated-Resource-Plan.

Tennessee Wildlife Resources Agency (TWRA). 2015. Tennessee Wildlife Resources Commission Proclamation 00-15 Endangered or Threatened Species. Accessed 02/23/2016 at: http://tennessee.gov/assets/entities/twra/attachments/endangered.pdf.

Thomas, D. 2014. *Industry and Interest Growing in Selmer and Adamsville*. Article published by the Jackson Sun Newspaper, Jackson, Tennessee, on 11 October, 2014.

Tioga Environmental Consultants. 2015. Phase I Environmental Site Assessment, Parcel 088 003.00 Selmer, McNairy County Tennessee, August 2015, Project No. 51626.00. Prepared for Pickering Firm, Inc.

Twyman, R. B. 1850. *Twyman's Memphis Directory and General Business Advertiser for 1850.* R. B. Twyman, printer. Memphis, Tennessee.

US Census Bureau (USCB). 2010a. American Factfinder. DP-1. Profile of General Population and Housing Characteristics: 2010. 2010 Demographic Profile Data. Accessed on 01/20/2016 at: http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

_____. 2010b. American Factfinder. P1. Race. 2010 Census Redistricting Data (Public Law 94-171) Summary File. Accessed on 01/20/2016 and 02/24/2016 at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_P1&prodType=table.

_____. 2014. American Factfinder. B17021 Poverty Status of Individuals in the Past 12 Months By Living Arrangement. Accessed on 01/20/2016 and 02/24/2016 at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_B17021&prodType=table.

_____. 1990. Public Law 94-171 (1990 Census). Accessed on 01/19/16 at: http://censtats.census.gov/cgi-bin/pl94/pl94data.pl.

_____. 2005. Population Division, Interim Projections of the Total Population for the United States and States: April 1, 2000 to July 1, 2030. Accessed on 01/19/2016 at: https://www.census.gov/population/projections/files/stateproj/SummaryTabA1.pdf.

US Climate Data. 2016. Climate Selmer -Tennessee. Accessed on 01/14/2016 at: http://www.usclimatedata.com/climate/selmer/tennessee/united-states/ustn0452.

US Department of Agriculture (USDA). 2012. Census of Agriculture – County Data, Tennessee. USDA National Agricultural Statistics Service.

_____. 2014. National Hydric Soils List. Accessed on 12/07/2015 at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

US Department of Transportation (USDOT). 2011. “Construction Noise Handbook.” Federal Highway Administration. Available at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook07.cf

US Environmental Protection Agency (USEPA). 1974. *Information on Levels of Environmental Noise Requisite To Protect Public Health And Welfare With An Adequate Margin of Safety.* March 1974. Prepared By the US Environmental Protection Agency Office Of Noise Abatement And Control.

_____. 2011. The 2011 National Emissions Inventory. Accessed on 01/14/2016 at: http://www3.epa.gov/ttn/chief/net/2011inventory.html.

_____. 2012a. Assessment Summary for Reporting Year 2012 Tennessee, Upper Hatchie Watershed. Accessed on 01/21/2016 at: http://iaspub.epa.gov/tmdl_waters10/attains_watershed.control.

_____. 2012b. Overview of Greenhouse Gases. Accessed 02/23/2016 at: http://www3.epa.gov/climatechange/ghgemissions/gases/n2o.html.

_____. 2015. The Green Book Nonattainment Areas for Criteria Pollutants. Accessed 02/23/2015 at: http://www3.epa.gov/airquality/greenbook/.

US Forest Service (USFS). 1995. Descriptions of Ecoregions in the US. Accessed on 01/03/2016 at: http://www.fs.fed.us/rm/ecoregions/descriptions/.

US Geological Service (USGS). 1980. 1951 Rose Creek, TN Quadrangle, photorevised. 7.5 Minute Series Topographic Map.

_____. 1995. Ground Water Atlas of the United States. 1995. Accessed on 12/24/2015 at: http://pubs.usgs.gov/ha/730k/report.pdf.

_____. 2000. Public Water-Supply Systems and Associated Water Use in Tennessee, 2000. Accessed on 02/23/2016 at: http://pubs.usgs.gov/wri/wri034264/PDF/PublicSupply.pdf.

_____. 2008. 2008 United States National Seismic Hazard Maps. Accessed on 02/23/2016 at http://earthquake.usgs.gov/hazards/products/conterminous/2008/.

US Fish and Wildlife Service (USFWS). 2007. Tennessee National Wildlife Refuge Amphibians, Fish, Mammals and Reptiles List. Accessed on 02/23/2016 at: http://www.fws.gov/southeast/pubs/TNMammallist07.pdf.

_____. 2015a. IPaC – Information, Planning, and Conservation System. Trust Resources List for the Selmer I and Selmer II Proposed Project Sites. Accessed on 12/10/2015 at: http://ecos.fws.gov/ipac/.

_____. 2015b. Species Profile for Indiana bat (*Myotis sodalis)*. Environmental Conservation Online System. Accessed on 01/04/2016 at: https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A000.

_____. 2015c. Species Profile for Northern long-eared bat (*Myotis septentrionalis*). Environmental Conservation Online System. Accessed on 01/04/2016 at: https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE.

_____. 2015d. Species Profile for Whorled Sunflower (*Helianthus verticillatus)*. Environmental Conservation Online System. Accessed on 01/04/2016 at: https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q3HO.

Whitten, J. 2011. *McNairy County's Forgotten Role in Shiloh Battle*. Article published in the Independent Appeal Newspaper, Jackson, Tennessee, 17 August, 2011.

Williams, S. 1954.The Island 35 Mastodon. American Antiquity 22(2):359-372.

Wright, M. J. 1882. *Reminiscences of the Early Settlement and Early Settlers of McNairy County, Tennessee.* Commercial Publishing Company, Washington, D.C.