

**FINAL
ENVIRONMENTAL ASSESSMENT
WILDBERRY SOLAR CENTER PROJECT
Fayette County, Tennessee**

Prepared for:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

Submitted by:
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Symbols, Acronyms, and Abbreviations

AADT	Annual Average Daily Traffic
AC	Alternating current
APE	Area of Potential Effects
ARAP	Aquatic Resource Alteration Permit
BMP	Best management practice
CEC	Chickasaw Electric Cooperative
CEQ	Council on Environmental Quality
CFR	Code of Federal Register
CO	Carbon monoxide
CRA	Cultural Resource Analysts
dB	Decibel
dba	A-weighted decibel
dbh	Diameter at breast height
DC	Direct current
DNL	Day-night sound level
EA	Environmental Assessment
EDR	Environmental Data Resources
EO	Executive Order
ESA	Endangered Species Act
GHG	Greenhouse gas
IRP	Integrated Resource Plan
kV	Kilovolts
µg/m³	micrograms per cubic meter
MSA	Metropolitan Statistical Area
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO₂	Nitrogen dioxide
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSL	Non-Site Locality
PM	Particulate matter
PM₁₀	Particulate matter having a diameter of less than or equal to 10 microns
PM_{2.5}	Particulate matter having a diameter of less than or equal to 2.5 microns
PPA	Power purchase agreement
PV	photovoltaic
ROW	Right-of-way
RSO	Renewable Standard Offer
SHPO	State Historic Preservation Office
SO₂	Sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
TVARAM	Tennessee Valley Authority Rapid Assessment Method
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish And Wildlife Service
WSC	Wildberry Solar Center, LLC

CHAPTER 1 – INTRODUCTION

The Tennessee Valley Authority (TVA) proposes to execute a power purchase agreement (PPA) with Wildberry Solar Center, LLC (WSC), an affiliate of Coronal Development Services LLC, for electricity generated by WSC's proposed 20-megawatt (MW) solar photovoltaic (PV) facility near the City of Moscow, Tennessee (Figure 1-1). The proposed solar farm would occupy up to 135 acres of a 347-acre site that WSC would lease for a 20-year period with 5-year extension options from the single private property owner. The proposed solar PV facility would be connected to the Chickasaw Electric Cooperative (CEC) distribution grid at an interconnection point located on the solar facility site. The existing 2.2-mile long CEC distribution line that runs west along Tennessee Highway 57 (TN 57) from the site to CEC's Moscow Substation would be upgraded to accommodate the electricity that would be generated by the proposed facility.

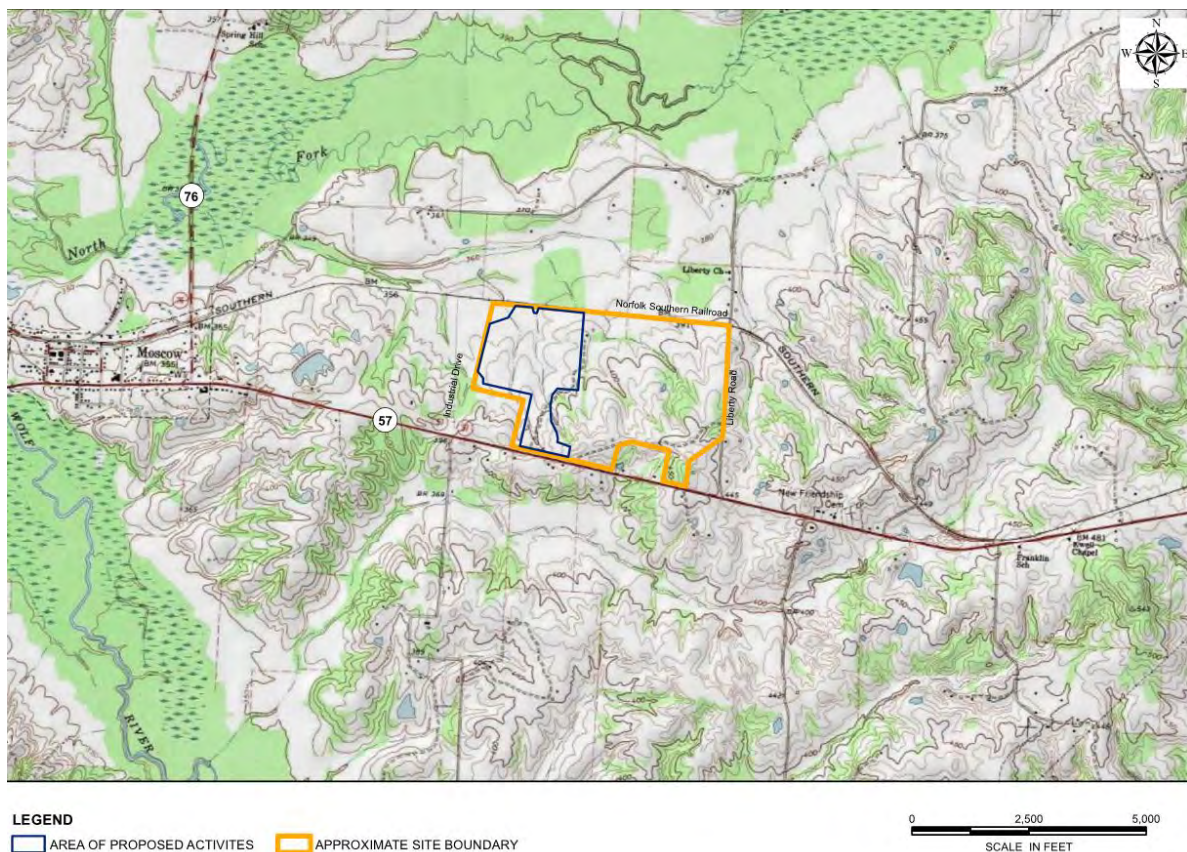


Figure 1-1. Location of the proposed Wildberry solar facility.

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. WSC has 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 of solar capacity by 2023. The proposed action would help meet this need for additional solar capacity.

1.2 Scoping and Public Involvement

The National Environmental Policy Act (NEPA) requires all federal agencies to consider the impact of their proposed actions on the environment in compliance with regulations implementing NEPA promulgated by the Council on Environmental Quality (CEQ; 40 Code of Federal Regulations [CFR] Parts 1500 to 1508) and TVA.

This Environmental Assessment (EA) has been prepared to assess the potential impacts on the human environment of the Proposed Action to enter into the PPA with WSC to purchase power generated at the proposed solar energy system. Described herein are the following:

- Existing environment at the project site
- Potential for environmental impacts associated with the Proposed Action and a No Action Alternative
- Cumulative impacts that could result from implementation of the Proposed Action in consideration of other ongoing or reasonably foreseeable projects in the surrounding area.

Under the RSO, TVA's obligation to purchase renewable power is contingent upon the satisfactory conclusion of the environmental review and TVA's determination that the action will be "Environmentally Acceptable." In order to determine acceptability, TVA must conclude that no significant direct, indirect, or cumulative impacts on 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.

Through the process of internal scoping and a review of applicable laws and regulations, TVA has identified the following resource areas for analysis in the EA due to the potential for impacts:

- | | |
|--|--------------------------------------|
| • Land Use and Zoning | • Waste Management |
| • Socioeconomics | • Transportation |
| • Environmental Justice | • Geology and Soils |
| • Visual Resources | • Surface Water |
| • Cultural Resources | • Wetlands |
| • Air Quality and Greenhouse Gas Emissions | • Vegetation |
| • Noise | • Wildlife |
| • Utilities | • Threatened and Endangered Species. |

TVA also considered potential effects related to groundwater, public and occupational health and safety, recreation, natural areas, and floodplains. However, TVA found these potential effects to be absent or minor and to not require further evaluation.

A draft of this EA was issued for public review and comment on February 12, 2016. The EA and instructions on how to submit comments were posted on the TVA website. A notice of its availability and request for comments was sent to interested Federal and state agencies and organizations. By the end of the comment period, which closed on March 14, 2016, TVA received comments from the Tennessee Department of Environment and Conservation (TDEC), the Southern Environmental Law Center on behalf of itself, the Sierra Club, and Community Sustainability, USA, Inc., and the U.S. Fish and Wildlife Service (USFWS). These comments (Appendix B) are discussed below.

TDEC commented on air quality, endangered species, invasive species, streams, wetland permits and mitigation, waste management, vegetation management, transformer coolant, and the ability of the facility to withstand seismic events. Sections 1.3, 2.1.2, 3.6.1, 3.11.1, 3.11.2.2, 3.13.2.2, 3.14.2.2, and the Literature Cited section were revised in response to these comments. TDEC also noted that the facility may provide an emergency source of electricity that could serve area emergency facilities in the event of an energy emergency. While such service is theoretically possible, the facility and its connections to the area power grid are not designed to provide this emergency service.

The Southern Environmental Law Center commented a lack of clarity on the impacts to wetlands, endangered species, and the beneficial impact on climate change. Sections 1.3, 3.13.1, and 3.13.2.2 have been revised to better describe wetlands permitting requirements, potentially affected wetlands, and the anticipated impacts to wetlands. The consultation with the USFWS on impacts to endangered and threatened species has been completed as described in Section 3.16.2.2. The beneficial impact on climate change is described in Section 3.6.2.2; a more project-specific analysis of this impact is not feasible.

The USFWS commented on endangered and threatened species, migratory birds and bald eagles, the use of best management practices, and invasive species. As indicated in Section 3.16.2.2, the consultation with the USFWS on impacts to endangered and threatened species has been completed. The presence of migratory birds in the project area and the potential impacts to them are described in Sections 3.15.1 and 3.15.2.2. Appropriate best management practices would be implemented during construction and operation of the solar facility, as stated in several places in this EA. As also stated in Sections 2.1.2 and 3.14.2.2, revegetation would be with native or non-invasive plants.

1.3 Necessary Permits or Licenses

As discussed in Section 2.1.2, the current designs proposed by WSC for the solar energy system would not involve discharges to surface waters. The project would not require a U. S. Army Corps of Engineers (USACE) Section 404 Permit. According to TDEC, the construction of the facility with the Option 2 layout (see below) would likely require a TDEC-issued Individual Aquatic Resource Alteration Permit. The installation of buried electrical conduits by using horizontal drilling under stream beds would also likely require a TDEC “no-notice” general permit for utility line crossings. The project would require clearing of woodland that is potential habitat for bats listed as endangered and threatened under the Endangered Species Act. TVA has therefore consulted with USFWS on the effects of the proposed action on listed species. The proposed solar energy system would require a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit,

as more than one acre of land would be disturbed by construction activities such as clearing, grubbing, or grading. At the request of WSC, the Fayette County Board of Commissioners rezoned the project property from Fringe Residential (R-2) to Light Industrial (I-L). WSC must file a site plan and building permit application to Fayette County for Site Plan Administrative Review approval prior to the start of construction activities. The solar energy system will be designed in accordance with all applicable standards in the National Electrical Code.

CHAPTER 2 - ALTERNATIVES

This chapter explains the rationale for identifying the alternatives evaluated in this assessment, describes each alternative, provides a comparison of the potential environmental impact of each alternative, and identifies the preferred alternative.

2.1 Description of Alternatives

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

2.1.1 Alternative A – The No Action Alternative

The No Action Alternative provides for a baseline of conditions against which the impacts of the Proposed Action Alternative can be measured. Under this alternative, TVA would not purchase the power generated by the project under the RSO PPA with WSC. In the absence of the PPA, WSC would not construct and operate the proposed solar facility, and CEC would not make the upgrades to its electrical system necessary to transmit the power generated by the facility. 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.

Environmental conditions in the Project Area would remain unchanged in the immediate future.

2.1.2 Alternative B – Proposed Action

Under the Proposed Action, TVA would enter into a PPA with WSC through the RSO program to purchase the electricity generated from the proposed solar energy system for a 20-year period. WSC would construct, operate, and maintain a 20-MW direct current (DC) PV solar power generation facility on a 347-acre privately owned tract of land located near the City of Moscow in southern Fayette County, Tennessee. The proposed solar array and associated improvements (e.g., access roads, fence) would occupy approximately 99 acres of the project site as a single-axis tracking system (Option 1 as shown on Figures 2-1 and 2-2), or 135 acres as a fixed-tilt array system (Option 2 as shown on Figures 2-3 and 2-4). In addition, a laydown area (approximately 5 acres) would be located within the fenced area and outside of the documented wetlands and streams.

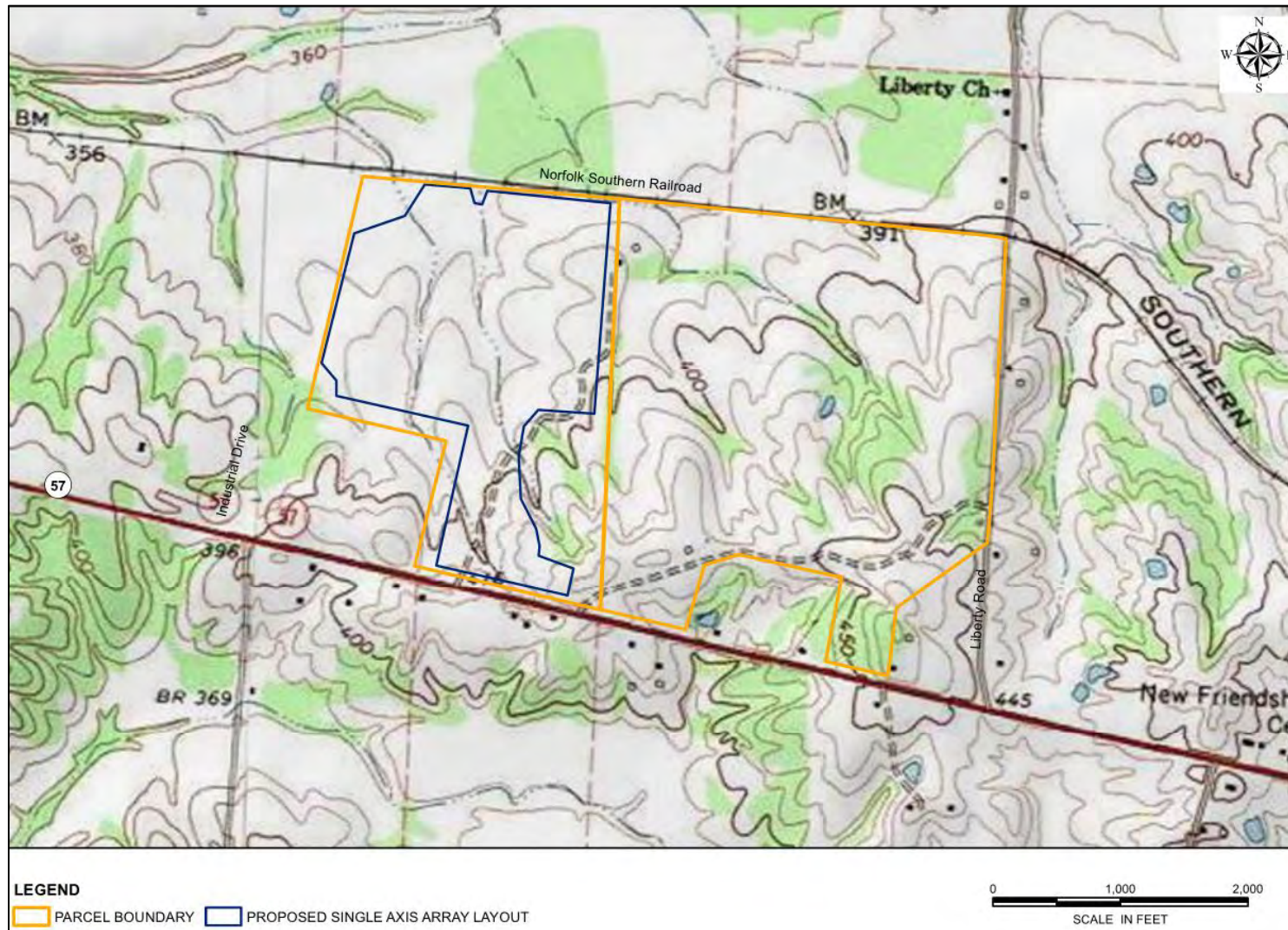


Figure 2-1. Wildberry solar development boundaries – Option 1, single-axis tracking system.

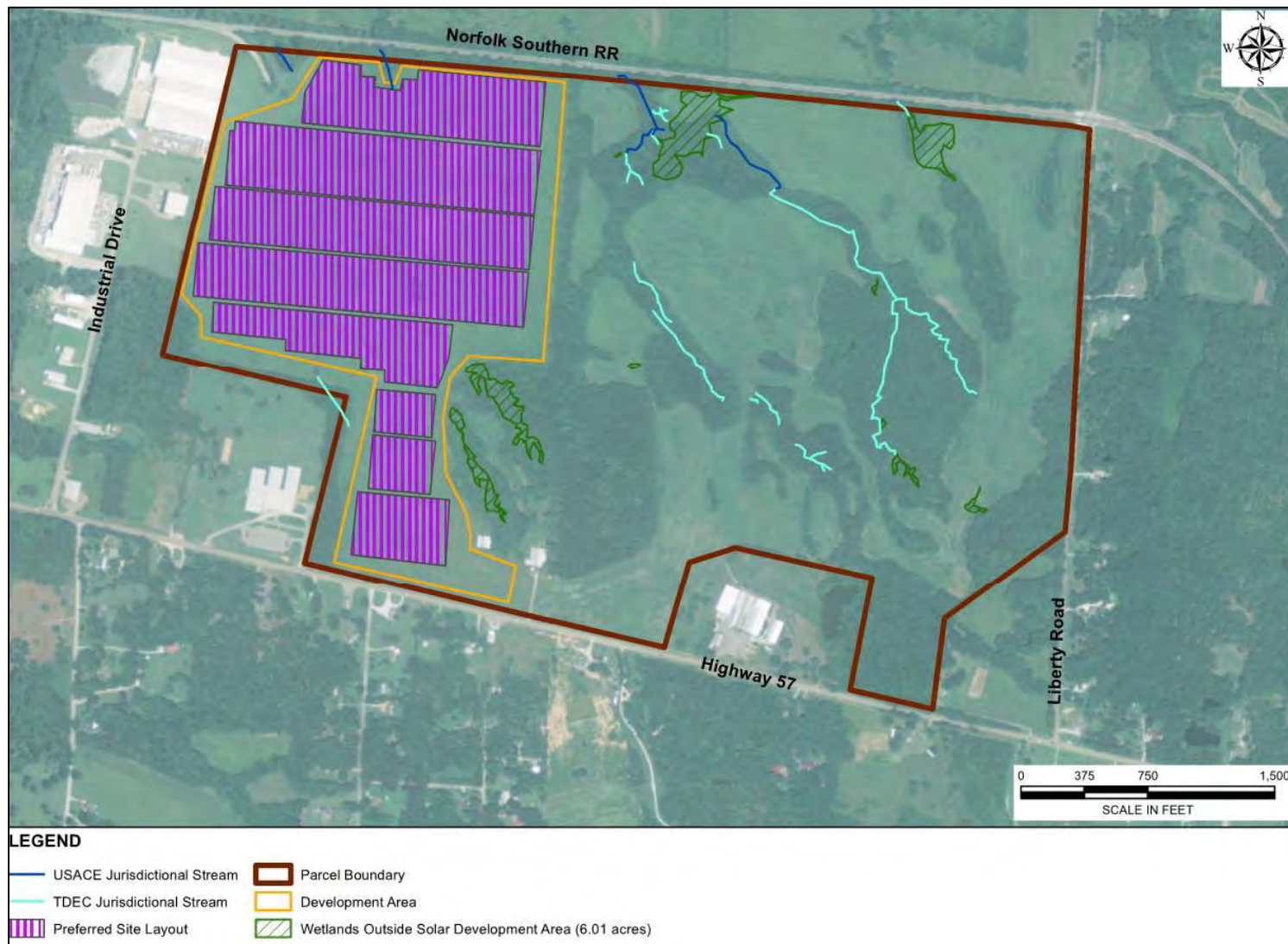


Figure 2-2. Wildberry solar conceptual site plan – Option 1, single-axis tracking system.

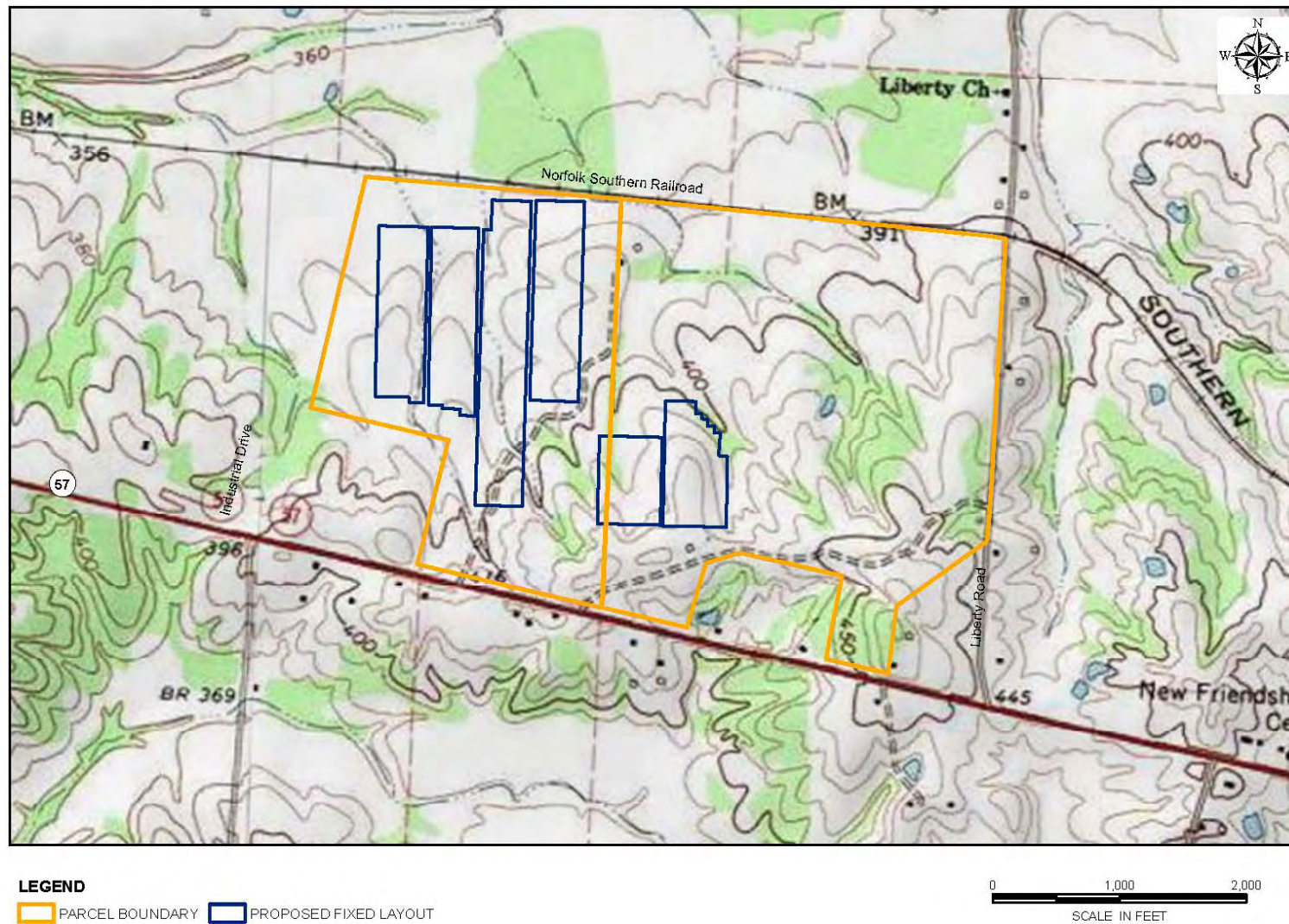


Figure 2-3. Wildberry solar development boundaries – Option 2, fixed-tilt system.

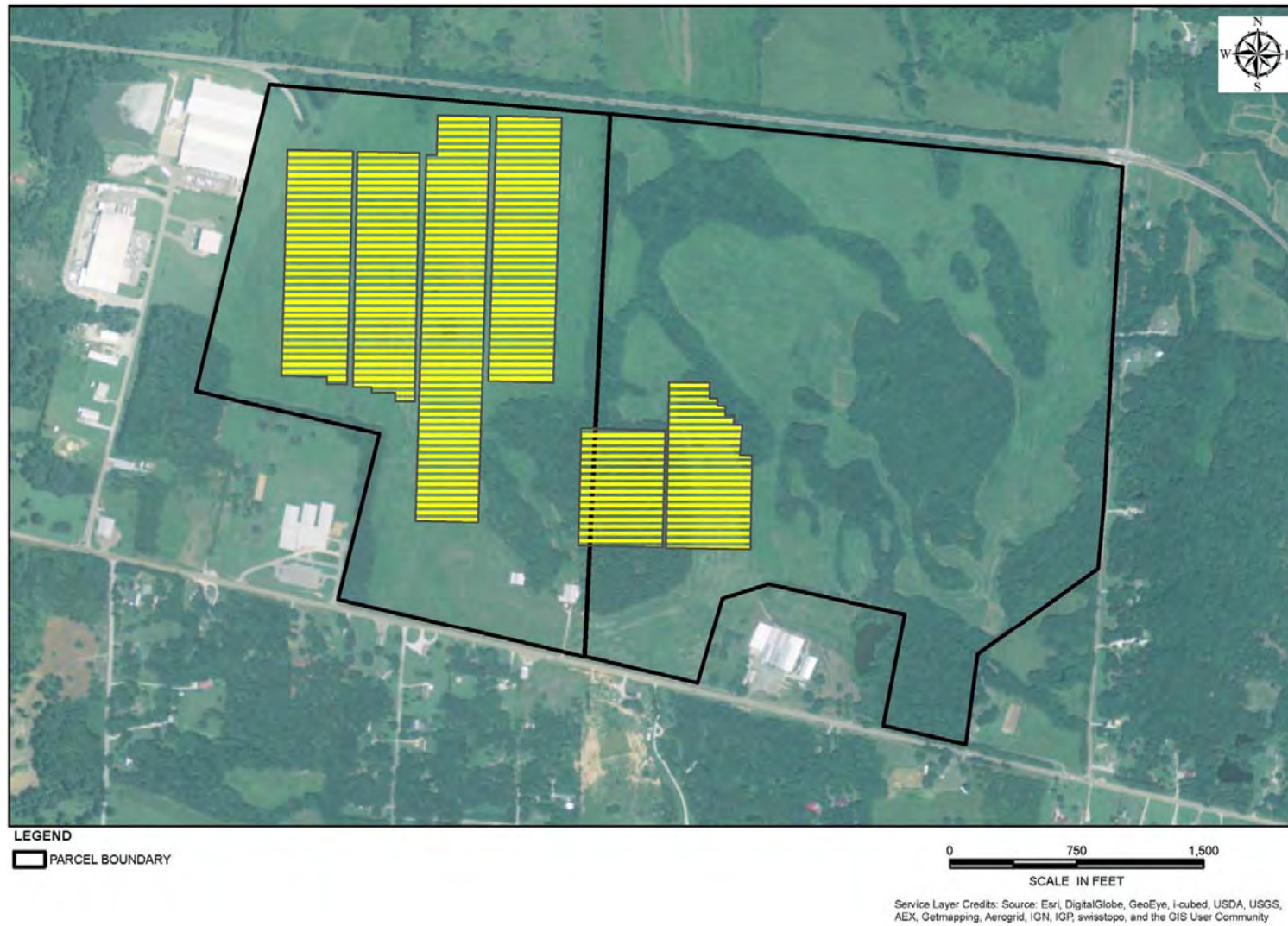


Figure 2-4. Wildberry solar conceptual site plan – Option 2, fixed-tilt system.

As shown on Figure 2-2, Option1 (single-axis tracker) would allow the solar panels to track from east to west as the sun's position shifts. The single-axis tracker collects solar energy more efficiently than traditional fixed-tilt racking systems, which results in higher energy generation per square foot of panel area. Solar panels would be secured within an array using prefabricated mounting kits, with the top of the solar panels reaching a maximum height of 10 feet, depending on position of the sun and weather conditions. Option 2 (see Figure 2-4, fixed-tilt racking system) would have panels set at a fixed angle, currently proposed at 25 degrees facing south and a maximum panel height of 10 feet.

Under both options, the PV panels would be secured using a series of posts, racks, and other hardware. The post would be installed into the ground to a typical depth of 8 to 10 feet, depending on local soil and wind conditions. These support structures are typically piles or metal posts that would be driven into the ground by either specialized pile drivers or drilled augers depending on future geotechnical analyses. No night lighting or security lighting would be installed; however, lights would be located within each inverter station cabinet for use when opened for inspection at night. Figures 2-5 and 2-6 show typical photographs of single-axis tracking and fixed-tilt systems, respectively.



Figure 2-5. Photovoltaic array – Option 1, single-axis tracking example.



Figure 2-6. Photovoltaic array – Option 2, fixed-tilt example.

Construction of the Option 1 solar facility would involve the clearing (removal of tall vegetation) of 98.2 acres of agricultural fields, clearing and grubbing of 0.44 acres of forest, driving posts, assembling the racking to the posts, installation of electrical conduit in trenches, and attaching the solar panels to the racking. Trenches (typically 24 to 36 inches deep) would be dug for connecting DC wiring in conduits between the arrays to up to nine inverter stations. All trenches would be backfilled to surrounding grade. Each DC to alternating current (AC) inverter, along with a transformer, would be mounted on a concrete equipment pad. AC wiring installed in conduits in trenches would connect the transformers to pad-mounted switchgear at the on-site interconnection point with the CEC electrical distribution system. The transformers would be filled with non-toxic coolant, most likely either mineral oil or natural esters. Switchgear would be located within the project site at the first pole for the CEC-owned 13.2-kilovolt (kV) interconnection feeder. From this first pole, the existing CEC distribution lines run south to TN 57 and then west approximately 2.2 miles to the CEC-owned Moscow Substation. To accommodate the increased load, CEC would rebuild the 2.2-mile line within the 60-foot-wide right-of-way (ROW) by removing the existing poles, installing new poles that are similar in height and structure, and reinstalling the existing conductors and a new conductor on the new poles. Figure 2-7 shows the line route (highlighted in red) from the project site to the substation.



Figure 2-7. Route of interconnection line to be rebuilt.

The construction of the Option 2 solar facility would require the clearing of approximately 98 acres of agricultural fields, clearing and grubbing of 43.2 acres of forest, and clearing of 1.92 acres of forested wetlands. The remaining construction activities, as well as the electrical interconnection line to the Moscow Substation, would be the same as for the Option 1 solar facility. Horizontal directional drilling would be used to install buried electrical conduits in the forested wetlands.

Standard practice is to work with the slope of the land and minimize grading work to the maximum extent possible. Any required grading would be limited to a maximum of approximately 99 acres under Option 1 and 135 acres under Option 2 within the fence line of the solar energy system (including laydown areas, roadways, nine 20-feet by 30-foot concrete pads, and other features).

Grading would be performed with portable earth-moving equipment and would result in a slope consistent with that of the existing grades. No soils would be disposed of offsite from the grading activities, and any soil imported would likely be limited to clean sand that would be used for foundations and/or trenching backfill. The existing gravel road would be used for access to the site from TN 57.

The project site is currently being used for agricultural and timber production. This area would be mowed or harvested as needed during construction and then would be revegetated, either naturally or by seeding, with native or non-invasive grass or other low-growing vegetation. In the forested areas to be cleared and grubbed, stumps and debris would be removed mechanically by bulldozer or similar equipment and the areas would then be graded. Marketable timber cleared for Option 2 would be sold and the remaining tree-clearing debris would either be burned on site or trucked to a landfill licensed to accept it. Due to the small volume of timber that would be cleared for Option 1, it may not be feasible for it to be sold. Any open burning would be conducted in accordance with state open burning requirements and in a manner to encourage good smoke dispersion. Open

burning would not occur during classes or other activities at the nearby school. Trees would be cleared in the forested wetland areas by chainsaw or other non-mechanized methods to minimize soil disturbance. No grubbing or grading would occur in the wetland areas, and no buildings would have to be removed. A 6-foot-high security fence, topped with three strands of barbed wire and equipped with a gate, would be installed surrounding the solar array system. A 15-foot wide gravel access road would be constructed around the perimeter of the solar facility inside the security fence.

There would be no major physical disturbance during the operation of the proposed solar facility. Routine maintenance, such as fence repair, vegetation management (e.g., mowing), and other periodic routine solar array operation and maintenance activities, would also periodically occur within the project site. Although TDEC recommended that electric-powered lawn equipment be used for vegetation management, the availability of mowers suitable for the size and type of vegetation on the solar farm site is limited. Most vegetation management would therefore be done using petroleum-fueled mowing equipment. The remaining 248 acres of the project site under Option 1 and 212 acres under Option 2 that are outside of the proposed perimeter fence would continue to be managed by the existing property owner as agricultural and forest land.

The following types of equipment would be used during construction activities:

- Backhoe(s)
- Bulldozer(s)
- Flatbed semi-truck(s)
- Semi-truck(s)
- Forklift(s)
- Bobcats and/or specialized tractors with extender or drill with auger or pile driver for installation of array support posts
- Concrete truck.

2.1.3 Alternatives Considered but Eliminated From Further Discussion

Siting requirements for a 20-MW solar energy generating facility include a contiguous area of at least 100 acres that is relatively level, proximity to an existing transmission line and/or substation capable of receiving the energy generated by the facility, and an adequate solar resource (i.e., adequate sunshine). Additional siting criteria include one or few landowners, a properly zoned site, and adjacent landowners that are receptive to the proposed development. WSC and its other financial stakeholders in this proposed facility have vetted several sites in the surrounding region of western Tennessee. This site has been selected and prioritized over the other sites based on proximity to a substation that can accept the modeled electric load from the proposed solar PV energy facility, the willingness of the private landowner to enter into a lease agreement with WSC, and the acceptance of the proposed facility by surrounding property owners and the authorities having local jurisdiction.

Another option for development of the project site was placement of the PV arrays into a compact square shape located in a more central portion of the project site. This design was originally conceived and eliminated by WSC following review of the results of the Critical Environmental Impacts Analysis, conducted by Arcadis in 2014. This analysis revealed that

the 2014 conceptual design, as outlined in Figure 2-8, would impact streams and wetlands. Therefore, the original conceptual square shape layout has been eliminated from further discussion and the Option 1 and Option 2 designs described above would result in less impacts to streams and wetlands.

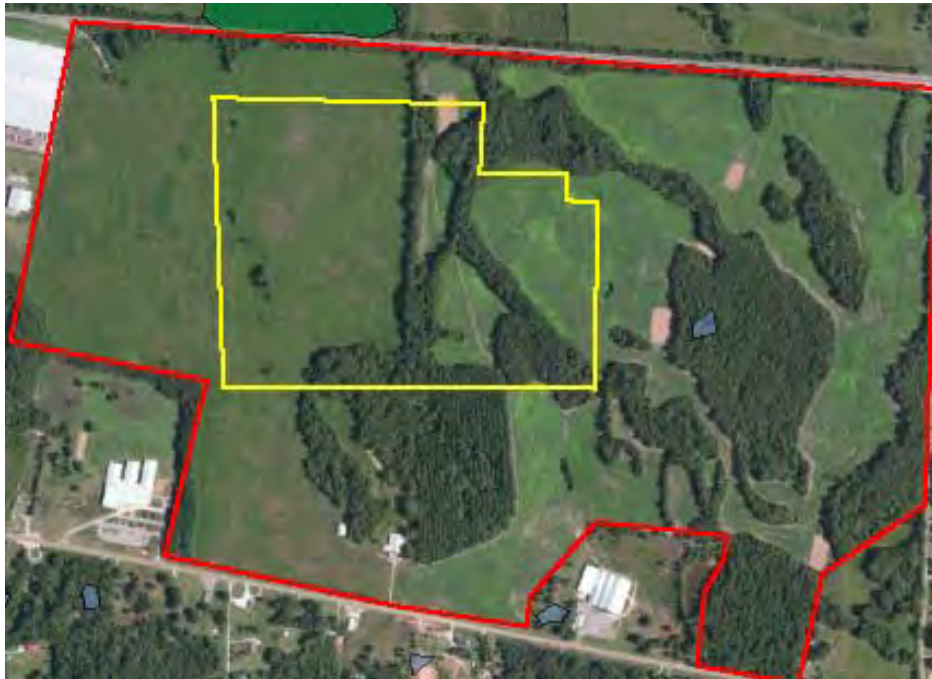


Figure 2-8. Photovoltaic array arrangement considered but eliminated from further discussion.

The draft of this EA assessed the anticipated environmental impacts of a different design for the Option 1 single-axis tracking facility with a less compact arrangement of the solar arrays (Figure 2-9). This design would have resulted in the clearing of a much larger area of forest (43 acres) and 1.92 acres of forested wetlands, than would the more compact design illustrated in Figures 2-1 and 2-2 and evaluated in Chapter 3 of this final EA.

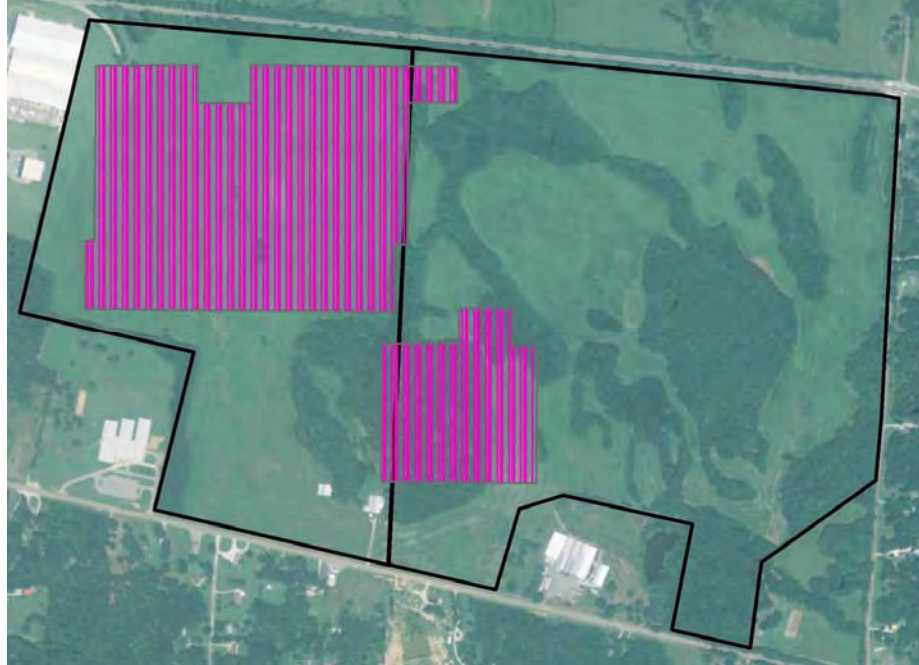


Figure 2-9. Option 1 single-axis tracking facility design considered in the draft EA.

2.2 Comparison of Alternatives

The summary and comparison of impacts by alternative for each resource area evaluated is provided in Table 2-1.

Table 2-1. Summary and comparison of alternatives by resource area.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Land Use and Zoning	No impacts anticipated	Minor direct, indirect, and cumulative adverse impacts. Land use of the site would change from agricultural to light industrial, with the surrounding area usage not changing. A relatively small portion of a large area land use category would be lost to a new use type. Minor cumulative impacts could result if other solar energy systems expand into the region.
Socioeconomics	No impacts anticipated	Minor beneficial direct, indirect, and cumulative impacts during construction and operation and maintenance activities by creation of local jobs, an increase in local tax base from an increase in assessed property value, and potential for expansion of future solar energy systems into the region.
Environmental Justice	No impacts anticipated	No direct or indirect impacts anticipated for either the solar PV system or the interconnection.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Visual Resources	No impacts anticipated	Minor direct, indirect, and cumulative adverse impacts. The security fence and solar energy generating system would be visible from points adjacent to the north, northwest, south, and southeast of the site. No impacts anticipated for interconnection as the right of way already contains line and poles. Minor cumulative impacts if other solar energy systems expand into the region.
Cultural Resources	No impacts anticipated	No direct, indirect, or cumulative impacts are anticipated for either solar PV system or the interconnection.
Air Quality & Greenhouse Gas Emissions	No impacts anticipated	Negligible temporary direct impacts would occur during construction activities. The project could reduce the amount of combustion necessary in the area for power production, resulting in a minor beneficial impact to air quality, and assist in the reduction of GHG emissions on behalf of TVA.
Noise	No impacts anticipated	Minor direct and indirect temporary adverse impacts would occur during construction activities for both solar PV system options and the interconnection. No direct, indirect, or cumulative impacts are anticipated during system operations.
Utilities	No impacts anticipated	Beneficial direct, indirect, and cumulative impacts to electrical supply in the area due to additional renewable energy resource supply and potential for expansion of future solar energy systems into the region.
Waste Management	No impacts anticipated	Minor direct, indirect, and cumulative adverse impacts anticipated for the solar PV system or the interconnection. Construction waste generated during construction activities would be directed to local landfills. Impacts during system operation would be negligible through implementation of a recycling program.
Transportation	No impacts anticipated	Minor direct and indirect temporary adverse impacts associated with construction activities for the solar PV system or the interconnection. No cumulative impacts.
Geology and Soils	No impacts anticipated	No direct, indirect, or cumulative geologic impacts anticipated for either the solar PV system or interconnection. Minor impacts to prime farmland.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Surface Water	No impacts anticipated	Minor, temporary, direct, and indirect adverse impacts during construction with small, beneficial, long-term impacts to surface water during operation of the solar energy system.
Wetlands	No impacts anticipated	No adverse impacts under Option 1. Minor direct, indirect, and cumulative adverse impacts from clearing of 1.92 acres of low to moderate quality forested wetlands under Option 2. Implementation of best management practices (BMPs) during construction would minimize impacts.
Vegetation	No impacts anticipated	Minor direct and no indirect or cumulative impacts associated with the clearing of 0.44 acres of forest under Option 1 and 45 acres of forest under Option 2. Long-term impacts associated with facility operation due to vegetation change from agricultural and forest cover to permanent grass and herb cover.
Wildlife	No impacts anticipated	Minor direct and no indirect or cumulative impacts associated with the clearing and grading of up to 133 acres including up to 45 acres of forest.
Threatened and Endangered Species	No impacts anticipated	Direct, indirect, and cumulative impacts associated with the clearing of 0.44 acres of potential forested habitat for endangered and threatened bats under Option 1 and 45 acres of forested habitat under Option 2. The impacts of this loss of bat habitat will be mitigated according to USFWS requirements.

2.3 The Preferred Alternative

The Preferred Alternative is the Proposed Action Alternative with Option 1 (single-axis tracker), which would fulfill the purpose and need for this project. This alternative entails the execution of the PPA by TVA and the associated construction, operation, and maintenance by WSC of a 20-MW DC PV solar power generation facility. This solar energy system has been designed to avoid the majority of environmental constraints identified and delineated and to have the least environmental impact possible, while helping to achieve TVA's renewable energy goals and helping TVA meet future energy demands.

2.4 Mitigation

Wildberry Solar Center would use routine best management practices such as dust suppression, erosion controls, and maintenance of buffers to minimize impacts to air and water resources. In accordance with the terms of the endangered species consultation, no tree clearing would occur between April 1 and July 31. Should WSC change its preferred design to the Option 2 fixed-tilt system design, WSC would apply for the necessary wetland permit from TDEC and implement any necessary wetland mitigation subject to TDEC and TVA approval. TVA would also consult with USFWS under the ESA on the increased

impacts to forested habitat for listed bats that would occur with the Option 2 design. TVA has not identified the need for additional mitigation measures to further reduce the anticipated environmental impacts.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the nature, extent, and importance of environmental resources in their existing setting on the project site. It provides a baseline for the assessment of potential effects of the alternatives described in Chapter 2. The scope of environmental consequences evaluated in this EA for the Proposed Action focuses on impacts related to the construction and operation of the proposed solar energy system at the project site. This information is summarized in Section 2.2 and in Table 2-1.

The CEQ defines a cumulative impact as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually insignificant but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impacts analysis recognizes the effects of the proposed alternatives on the various resources. It also recognizes the effects of other past, present, and reasonably foreseeable future actions, and it describes the additive or cumulative effects that might result. Although some cumulative effects, however minimal, could be identified for virtually any resource or condition, the effects described in this document are believed to be the most pertinent and most representative of those associated with the proposed action. The cumulative impacts associated with the proposed action are described in detail in the individual resource sections in Chapter 3.

According to the Federal Emergency Management Agency Flood Insurance Rate Maps (47047C0453C and 47047C0461C), the project area is designated as Zone X, meaning it is located above the 500-year floodplain and there is a minimal risk of flooding. Therefore, there would be no direct, indirect, or cumulative floodplain impacts under the Proposed Action Alternative, and the proposed action would comply with Executive Order (EO) 11988 – Floodplain Management. The project site has not been designated a natural area, open space, or park and no such areas occur in its immediate vicinity. There is one state natural area (Wolf River State Natural Area) located within 5 miles of the Project Area.

3.1 Land Use and Zoning

This section provides an overview and details of the existing land use at and surrounding the project site, as well as the potential impacts on land use that would be associated with the alternatives.

3.1.1 Affected Environment

The term ‘land use’ can be characterized as the way in which land has been developed and utilized in the agricultural, residential, and industrial landscapes. The proposed solar facility site is located in an unincorporated part of Fayette County, adjacent to the eastern city limits of Moscow. Fayette County has developed a county-wide zoning ordinance in order to control the direction of development and to keep similar land uses together. The Project Area comprises two adjacent parcels (347 acres total) that were zoned as R-2, Fringe Residential. The proposed solar facility would occupy approximately 135 acres of this privately owned land. Permitted uses in areas designated R-2 include single family dwellings, duplexes, manufactured homes, accessory buildings, and certain small enterprises operated by a resident of the lot (Fayette County 2013).

On February 24, 2015, 184.18 of the 347 acres of the Project Area were rezoned at the request of WSC to an I-L Light Industrial Zoning District classification. The remaining 162.82 acres continues to be classified in the R-2 Zoning District, as shown on Figure 3-1 below. The I-L Zoning District is composed of land and structures occupied by or suitable for light manufacturing, storage, wholesaling, warehousing, and similar uses. The Fayette County Zoning Regulations permit a range of light industrial uses subject to limitations intended to protect nearby residential and business districts (Fayette County 2013). The I-L Zoning District allows for uses such as electric power generating stations, electric transmission lines, ROWs for electric transmission lines of 44-kV or greater, and utility substations.

The rezoning of the 184.18 acres of land was completed through a Fayette County Legislative Body Resolution to Amend the Fayette County Zoning Map. The goal of this rezoning was to accommodate the siting and construction of the proposed solar facility. In accordance with this Resolution, the 184.18 acres comprised all of Parcel 17 on Fayette County Tax Map 169 and a portion of Parcel 17 (highlighted in purple on Figure 3-1). The remaining portion of Parcel 17 (162.82 acres) on Tax Map 170 remained in the R-2 Zoning District (see Figure 3-1).

The current property owner uses the land for agricultural and tree harvesting purposes. Surrounding land use and zoning designations include a mix of R-2, I-L, rural residential (R-1), and Community Business (B-1 and B-3), with Moscow city limits and Norfolk Southern Railroad adjacent to the west and north of the project site, respectively (see Figure 3-1).

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, the proposed solar energy system would not be constructed. Therefore, no project-related impacts to land use would be anticipated. Existing land use would be expected to remain under current agricultural and tree harvesting usage. Existing land use in the surrounding areas would be expected to remain a mix of residential, industrial, and unused land.

3.1.2.2 Alternative B – Proposed Action Alternative

Minor direct, indirect, and cumulative land use impacts would be expected with the Proposed Action Alternative. Under the Proposed Action Alternative, up to 135 of the 184.18 acres of project area that is zoned as I-L would change from agricultural and tree harvesting to light industrial with the installation of the solar energy system. The use of this area for the solar facility is compatible with its I-L zoning, and all of the requirements associated with the I-L zoning will be met for both the Option 1 and Option 2 facility designs. The remaining I-L zoned land and the 163 acres zoned as R-2 would continue to be used for agricultural and tree harvesting purposes by the private landowner. The adjacent and surrounding land uses would remain the same and would generally be unaffected by the change in land use at the project site.

There are no known large developments, including other solar facilities, proposed in the surrounding area. The construction and operation of the proposed solar facility is unlikely to result in changes in land uses in the surrounding area; therefore, any cumulative impacts on land use would be minimal.



Figure 3-1. Existing zoning of project site and surrounding areas.

3.2 Socioeconomics

3.2.1 Affected Environment

The proposed project is located immediately adjacent and east of the incorporated City of Moscow in unincorporated Fayette County, approximately 50 miles east of Memphis. Fayette County is identified as the area of impact with regard to socioeconomics.

Socioeconomic Environment

The population of Fayette County, as reported by the United States Census in 2010, was 38,413 (U.S. Census Bureau 2015). The estimated 2014 Fayette County population is 39,011. Census Tract 606, which contains the project site, had a 2010 population of approximately 4,072 according to the U.S. Census (U.S. Census Bureau 2015). According to the Fayette County Chamber of Commerce website, while still considered a rural and agricultural area, Fayette County is experiencing a transition due to suburban sprawl from nearby Memphis, and the County is promoting both industrial and community growth. Fayette County is less than 1 hour from major airports and ports and is home to Norfolk Southern's largest intermodal facility.

The Town of Somerville is the county seat of Fayette County. According to the State of Tennessee Labor Market Report (State of Tennessee 2015), Fayette County was designated in 2015 as eligible for consideration as a Labor Surplus Area, indicating an unemployment rate greater than 9.32 percent. Employers in these areas may be given preference in bidding on federal procurement contracts. The purpose in providing such preference is to help direct the government's dollars into areas where people are in the most severe economic need. The total non-farm employment declined by 12,300 jobs from December 2014 to January 2015 in the Memphis Metropolitan Statistical Area (MSA), which includes Fayette County. The Memphis MSA saw seasonal decreases in professional and business services, trade/transportation/utilities, leisure/hospitality, government, mining/logging/construction, and durable and non-durable goods manufacturing. These declines were partially offset by an increase of jobs in professional/scientific/technical services (State of Tennessee 2015).

More recent data from the U.S. Department of Labor, Bureau of Labor Statistics, indicated that, in November 2015, the unemployment rate in Fayette County was 6.3 percent. By comparison, the unemployment rate for the State of Tennessee in November 2015 was 5.4 percent. The per capita annual income (2009-2013) in Fayette County was \$28,201, and the median household income for the same year was \$56,618. By comparison, in the State of Tennessee, the per capita annual income for 2009-2013 was \$24,409, and the median household income was \$44,298 (U.S. Department of Labor 2015). These data indicate that the unemployment rate in Fayette County remains higher than that of the state. Conversely, the per capita annual income and median household income is lower for the state than for Fayette County.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not purchase the power from WSC. Therefore, the proposed solar energy system would not be constructed, and there would be no impacts to socioeconomics. The existing land use and the existing socioeconomic conditions would remain the same.

3.2.2.2 Alternative B – Proposed Action Alternative

Under the Proposed Action Alternative, construction activities at the project site are anticipated to take approximately 6 months to complete. During that time, a crew of approximately 8 to 12 personnel would be employed, with approximately 12 personnel on site during peak construction. Personnel would include a mix of general laborers, electrical technicians, and journeyman-level electricians, a majority of whom would come from the local/regional workforce. Work is anticipated to be conducted 5 days per week for up to 6 months, with no weekend or holiday work. Short-term beneficial economic impacts are anticipated resulting from construction activities, including the purchase of some materials, equipment, and services locally, and a temporary increase in local employment and income. This increase would have positive impacts locally and regionally. Local vegetation management providers will be contracted to complete operation and maintenance activities during the lifecycle of the project, which will also result in beneficial economic impacts.

Tennessee offers a special ad valorem property tax assessment for certified green energy production facilities. Tennessee [SB 1000](#) stipulated that the assessed property value of all certified green energy production facilities (as defined in Tenn. Code § 67-4-2007) may not exceed 12.5 percent of installed costs for solar. In addition, [Tenn. Code Ann. Section 67-6-346](#) would allow for WSC to apply for a refund of taxes paid, or to apply for authority to make tax-exempt purchases of machinery and equipment used to produce solar electricity. Impacts to the local tax base would be slightly positive through a slight increase in assessed property value and associated property taxes, which are estimated by WSC to be approximately \$540,000 over the 20-year term of the project. There would be insignificant direct, indirect, or cumulative socioeconomic impacts associated with the operation of the proposed solar facility.

3.3 Environmental Justice

3.3.1 Affected Environment

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations was issued in 1994 to focus federal attention on the environmental and human health effects of federal actions on minority and low-income populations, with the goal of achieving environmental protection for all communities. The EO directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations to the greatest extent practicable and permitted by law. Although EO 12898 does not apply to TVA, TVA routinely considers environmental justice in its planning processes.

Minority individuals are those who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black (not of Hispanic origin), or Hispanic. Minority populations in an affected area should be identified where either the minority population of the affected area exceeds 50 percent, or the minority population percentage of an affected area is meaningfully larger than the minority population percentage in the general population of the surrounding region (CEQ 1997). According to the U.S. Census, the minority population of the State of Tennessee in 2013 was 24 percent and in Fayette County (2013) was 31.2 percent. By comparison, Census Tract 606, which contains the proposed solar facility, had a minority population of 38.17 percent.

Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty (CEQ 1997). Poverty status is reported as the number of persons or

families with income below a defined threshold level. Fayette County's poverty rate for the years 2009-2013 was 14 percent, and the poverty rate for Census Tract 606 was 16.7 percent, which is lower than the State of Tennessee poverty rate for the same years (17.6 percent; U.S. Census Bureau 2015).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

No direct, indirect, or cumulative impacts are anticipated as a result of the No Action Alternative on minority or low-income communities.

3.3.2.2 Alternative B – Proposed Action Alternative

There would be no direct, indirect, or cumulative disproportionate impacts on minority or low-income populations associated with the Proposed Action Alternative. A greater proportion of the local population is comprised of minority individuals than the county and state proportions. Conversely, the poverty rate for the local population is somewhat lower than the state rate and somewhat higher than the county rate. The proposed facility would not be located adjacent to residential neighborhoods, and no residents would be displaced. The temporary increase in construction-related traffic would be negligible (see Section 3.10.2) and therefore, would not be expected to impact local populations in an adverse manner for an extended period of time. Implementation of the proposed action is anticipated to result in a slight overall net decrease in air quality pollutants and GHGs. The Proposed Action would not have the potential to affect human health or the environment through the exclusion of persons, the denial of benefits, or the subjection of persons to discrimination or health and/or safety risks.

3.4 Visual Resources

Visual resources are the visual characteristics of a place, including both natural and man-made attributes. How an observer experiences a particular location can be determined by the visual resources at and surrounding that location. The following sections describe the aesthetic and visual characteristics of the project site and surrounding area.

3.4.1 Affected Environment

The project site is currently a mix of agricultural and woodland immediately east of the incorporated City of Moscow. The project site is bounded by TN 57 to the south, Liberty Road to the east, an industrial area and the Moscow-La Grange Elementary School to the west, and the Norfolk Southern Railroad to the north. The project site is surrounded by agricultural land, residential and industrial properties, and the school. There are buildings currently located on the property, including a former farm equipment storage shed with an attached smaller shed on each side; a sawmill building with two attached smaller sheds; and an adjacent carport. Approximately 32 percent (114 acres) of the project area is forested. The forested areas are located throughout the project area with the larger stands in the central portion and eastern half of the property. About a third of the forested area occurs on the site of the proposed solar facilities. A gravel road is located in the south-central portion of the property and would remain under the Proposed Action Alternative along with the existing buildings.

The industrial properties west of the site have unrestricted views of the proposed solar facilities site (Figures 3-2 and 3-3, Photograph 3). Between the proposed development and the school to the southwest is an approximate 250-foot buffer that is zoned as R-2, Fringe Residential. A tree line on the school property boundary effectively blocks views of the

solar facilities site from the school property (Photograph 1). The nearest residences from which the solar facilities site is visible are south of TN 57 and 700 to 800 feet south of the site (see Figures 3-2 and 3-3). Sporadic tree lines parallel the northern side of TN 57 and restrict views of the solar facilities site by passing motorists (Photograph 2). The existing CEC power line between the solar facilities site and the Moscow substation is readily visible along TN 57.

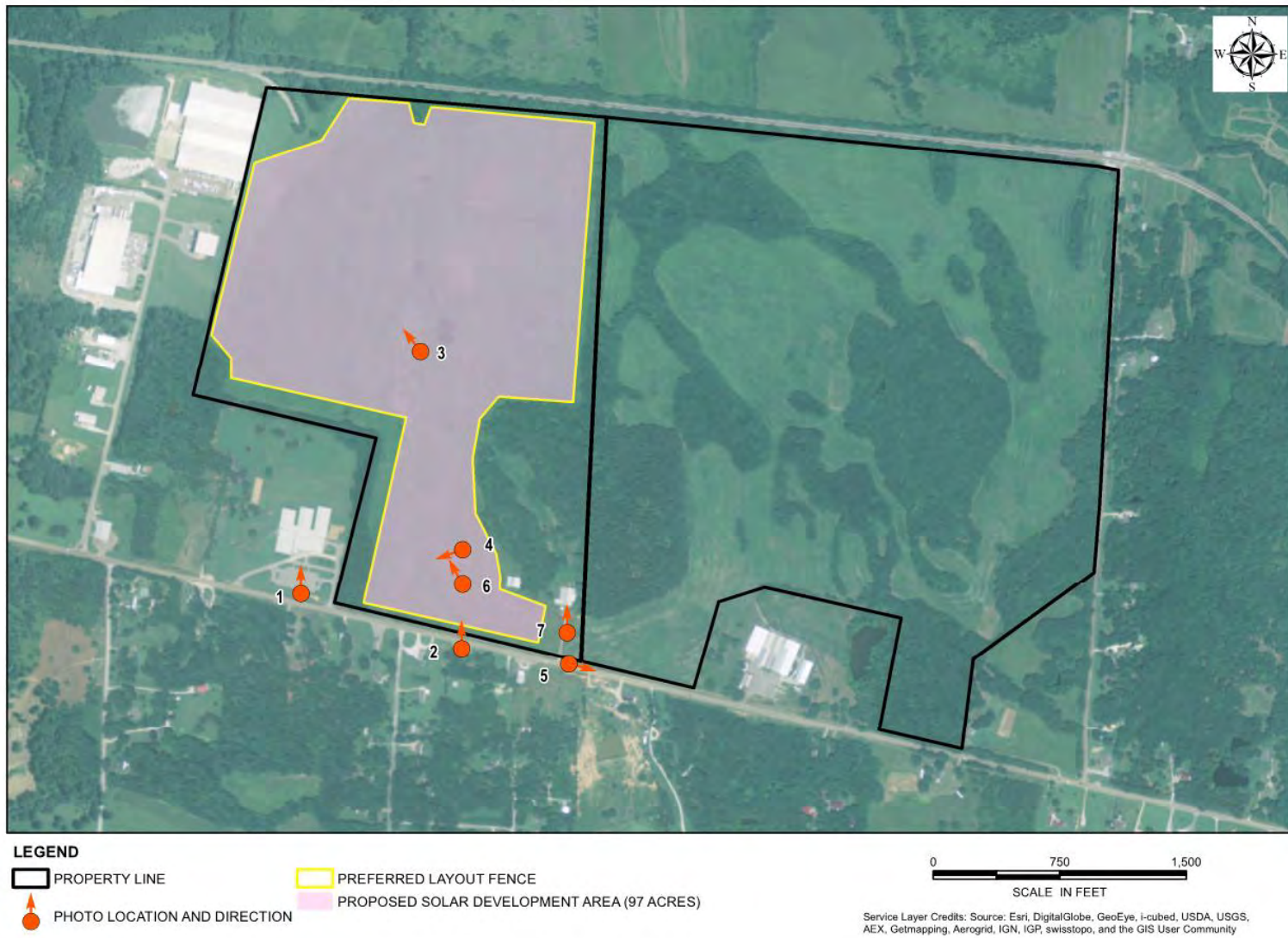


Figure 3-2. Locations of photographic documentation, with Option 1, single-axis tracking system design.

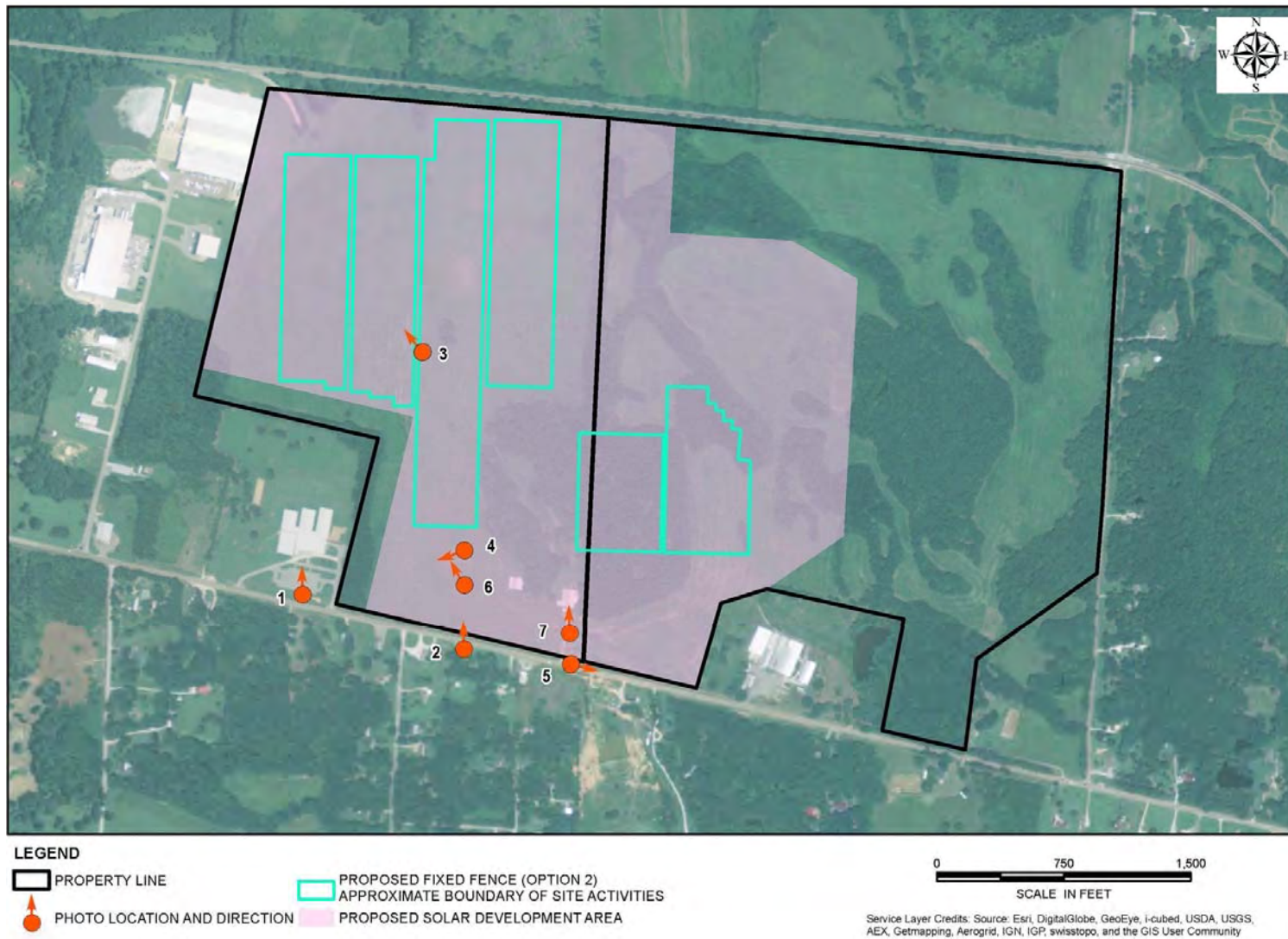


Figure 3-3. Locations of photographic documentation, with Option 2, fixed-tilt system design.



Photograph 1. View of school (on left) and tree line that runs between school and property buffer along with the existing interconnection line adjacent to TN 57.



Photograph 2. Typical view of project site facing north from TN 57.



Photograph 3. View of western portion of project site facing northwest showing agricultural fields in the foreground and industrial development in the background.



Photograph 4. View of western boundary from south-central portion of project site with treeline along school property boundary in background.



Photograph 5. View of southern property boundary along TN 57, facing east.



Photograph 6. View of northwestern portion of the project site, from southern boundary.



Photograph 7. View of sawmill, sheds, gravel road, and CEC-owned interconnection line from TN 57.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not enter into a PPA with WSC, and the proposed solar energy system would not be constructed. Therefore, no project-related impacts to visual resources would result, as no change in the appearance of the project site or within the surrounding areas would occur as a result of project activities. Existing views would remain unchanged from the present setting of agricultural land and scattered residences. The landscape may, however, change over time depending on actions of the area landowners. Additionally, the private landowner could develop alternative light industrial uses on the 184 acres rezoned for light industry.

3.4.2.2 Alternative B – Proposed Action Alternative

Minor direct, indirect, and cumulative adverse effects would be expected with the Proposed Action Alternative. During the course of construction, visual changes at the project site would result from the presence of construction equipment and delivery equipment, as well as the presence of personnel and their vehicles. In addition, heavy machinery would be visible both on site and travelling to and from the site on existing roadways, changing the current agricultural and forested landscape to one that contains man-made items and materials.

The viewshed would change during construction with vehicles, equipment, and personnel present at the project site. Upon completion, the solar energy system would consist of approximately 66,000 solar PV panels on steel racking structures and associated electrical equipment on nine concrete pads. Under both options, the panels would be approximately 10 feet above ground at its tallest point, making the panels the highest structure associated with the proposed development. The position of the solar panels under Option1 (single-axis

tracker) would track from east to west as the sun's position shifts, with a potential minimum panel heights of 6 feet. Under Option 2 (fixed-tilt racking system) the solar panels would be set at a fixed angle, currently proposed at 25 degrees facing south. The development would be surrounded by a 6-foot-tall security fence topped with barbed wire and a gate for security and safety purposes. The fence, PV panel arrays, and other electrical infrastructure would be visible from points to the north (occupied by a railroad), south (occupied by scattered residential and commercial businesses along TN 57), northwest (occupied by industrial properties), and southeast (occupied by an industrial property) of the site. The existing trees along the southwestern and eastern boundaries of the project area would remain after construction activities and would block views of the solar energy system and fencing, particularly from the Moscow-La Grange Elementary School. The perception of greater visual impacts would be associated with Option 2, as the 10-foot high fixed panels would be angled towards the scattered residential and commercial properties south of the site. Under Option 1, the panels would face east to west, visible to industrial properties, and the panel heights would vary from approximately 6 to 10 feet, depending on the position of the sun.

The facility electrical interconnection would be on site at the first CEC powerline pole (see Photograph 7, and Figure 3-2). CEC would rebuild the existing powerline along TN 57 from the facility site to the Moscow Substation. The rebuilt powerline, with the additional conductors to transmit the power generated by the solar facility, would appear very similar to the existing powerline. Once the solar energy system components are installed and operational, the only other equipment present would be periodic and associated with maintenance and regular mowing within the fenceline of the solar facility.

Given the overall change from a gently rolling agricultural landscape to one that contains man-made items, impacts to visual resources would be minor. If more solar energy systems are developed throughout the region, the project site could result in a minor cumulative impact to visual resources. It is anticipated that the remaining area outside of the fenceline and access road would continue to be used for agricultural and timber production.

3.5 Cultural Resources

Cultural resources include, but are not limited to, prehistoric and historic archaeological sites, historic structures, and historic sites at which important events occurred. Cultural resources are finite, non-renewable, and often fragile. They are frequently threatened by industrial, commercial, and residential development, as well as construction of roads and other infrastructure. TVA is mandated by the National Historic Preservation Act of 1966 (NHPA) and the Archaeological Resources Protection Act of 1979 to consider ways to avoid effects from TVA undertakings on significant cultural resources (e.g., archaeological sites and historic structures). The NHPA addresses the preservation of "historic properties," which are defined under the Act as any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP).

Two broad categories of cultural resources are archaeological resources and historic architecture. Some examples of archaeological resources are earthworks, weapons and projectiles, human remains, rock carvings, and remains of subsurface structures, such as domestic fire pits. Historic architecture consists of standing structures that are 50 years old or older. Consistent with Section 106 of the NHPA, such structures, as well as archaeological resources, must meet certain criteria to qualify for inclusion on the NRHP.

3.5.1 Affected Environment

Between April and September 2015, Cultural Resource Analysts, Inc. (CRA) staff, on behalf of Arcadis, conducted Phase I archaeological and historic architecture surveys of the area of potential effects (APE) for the proposed solar facility (CRA 2015a, 2015b). The purpose of the surveys was to locate and identify archaeological and historic architecture resources within the APE and to evaluate their eligibility for inclusion in the NRHP. Prior to conducting field surveys, CRA and Arcadis conducted a record and literature search through the Tennessee Division of Archaeology to determine the presence of known archaeological sites, and a search through the Tennessee Historical Commission and NRHP records to determine the presence of known architectural/historical resources within the APE.

Architectural Resources

Desktop and field analyses were completed by CRA regarding the Proposed Action's potential to affect historic properties. The purpose of the analyses was to identify previously recorded historic architectural resources within the APE, which was defined to include a 0.5-mile buffer surrounding the proposed fence line of the solar energy system. The review included an analysis of historical aerial imagery and topographic quadrangles, a review of the files maintained by the Tennessee Historical Commission State Historic Preservation Office (SHPO), and a review of the NRHP and National Historic Landmark databases maintained by the National Park Service. Information on known historic architectural resources occurring in or near the APE was examined, as well as previously completed cultural resources reports and historic documents pertinent to the APE. Upon confirming that there are no previously recorded historic architectural resources within the APE, a comparative review of modern and historical imagery and historical topographic quadrangle maps was undertaken to identify any historic architectural resources (50 years of age or older) located within the APE. Based on the above research, a total of 11 single or grouped structures were identified within the 0.5-mile APE (Figure 3-4). Each of these structures was visited, and lines of sight were documented. Construction dates for each of the identified architectural resources were determined using data in the Tennessee Property Viewer.

None of the identified resources within the APE were known to have any significant associations to noteworthy events or persons that would warrant listing in the NRHP under Criterion A, B, or C. CRA recommended that none of these resources are eligible for listing in the NRHP and that a finding of no architectural properties affected is appropriate for the Proposed Action (CRA 2015a). TVA agrees with this recommendation.

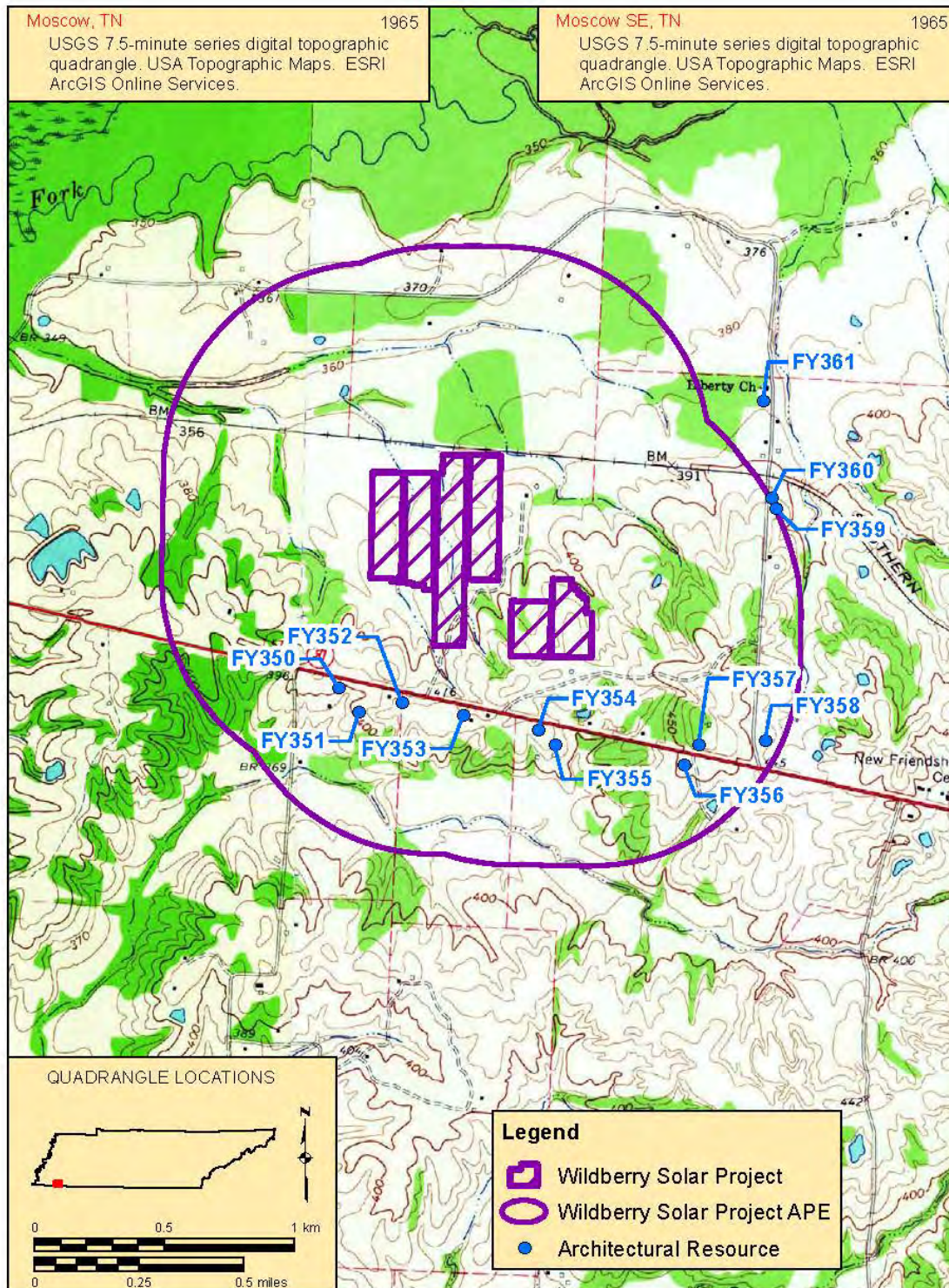


Figure 2. Topographic map depicting the project area, APE, and locations of the recorded architectural resources.

Figure 3-4 Architectural survey results.

Archaeological Resources

Six known archaeological sites were identified by previous surveys within a 1.0-mile radius of the project area. No known archaeological sites were previously located within the project area. The archaeological survey of the project area consisted of a pedestrian survey supplemented by screened shovel testing. As a result of the survey, three non-site localities were identified (Figure 3-5). Several scattered artifacts were recovered from the project area and are considered isolated finds. The findings associated with these sites (CRA 2015b) are summarized as follows:

- Non-Site Locality (NSL) 1 was located in a wooded area in the southeast quadrant of the project area, and consisted of several piles containing machine-made bricks and a small amount of historic cultural material.
- NSL 2 was located primarily within planted pines in the southern and central portion of the project area. Cultural material, consisting of a light scatter of early- to mid-twentieth-century ceramics, glass, metal, and brick, was recovered from a series of nine shovel tests. No aboveground structural remains were present.
- NSL 3 represents a structure that was recorded on both the 1949 U.S. Army Corps of Engineers Moscow, Tennessee, 15-minute topographic map and on the 1965 U.S. Geological Survey Moscow SE 7.5-minute topographic map. Aboveground structural remains consisted of portions of a collapsed brick chimney and metal household furnishings and fixtures. A small amount of cultural material was also recovered from two shovel tests excavated within and adjacent to the structure's footprint.

Due to the low density of material recovered at NSLs 1, 2, and 3, and a lack of diagnostic artifacts demonstrating pre-1933 occupation of the structures previously documented at those locations, the three localities were not classified as archaeological sites, and no site forms were submitted to Tennessee Division of Archaeology. No archaeological sites were identified during the survey. Therefore, no further archaeological investigations were recommended (CRA 2015b). TVA agrees with CRA's survey findings and recommendations.

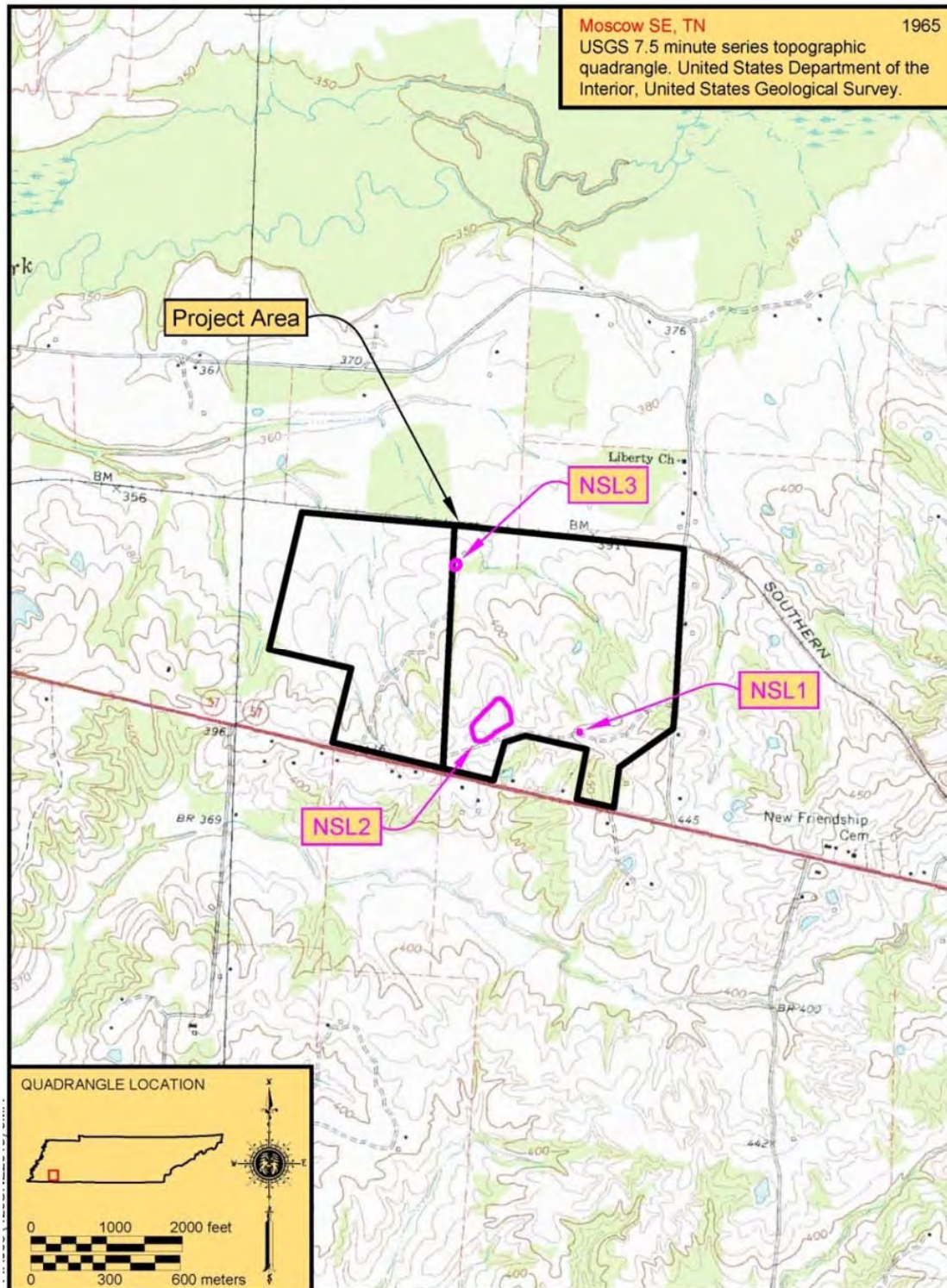


Figure 3-5 Archaeological survey results.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, the proposed solar energy system would not be constructed; therefore, no project-related impacts to historic properties would occur.

3.5.2.2 Alternative B – Proposed Action Alternative

There would be no direct, indirect, or cumulative impacts to historic properties associated with the Proposed Action Alternative. Based on the architectural survey, the Phase I Archaeological Survey, and previous records searches, no archaeological sites or historic resources listed on or eligible for inclusion on the NRHP would be affected by construction of the proposed solar generating facility. On December 10, 2015, TVA consulted on these findings with the Tennessee SHPO and with federally recognized Indian tribes. On January 11, 2016, the Tennessee SHPO concurred with TVA's determination (Appendix A).

3.6 Air Quality and Greenhouse Gas Emissions

3.6.1 Affected Environment

Air quality is a valuable environmental resource. Through its passage of the Clean Air Act, Congress mandated the protection and enhancement of our nation's air quality resources. National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants have been set to protect the public health and welfare:

- Sulfur dioxide (SO₂)
- Ozone
- Nitrogen dioxide (NO₂)
- Particulate matter whose particles are less than or equal to 10 microns (PM₁₀)
- Particulate matter whose particles are less than or equal to 2.5 microns (PM_{2.5})
- Carbon monoxide (CO)
- Lead.

The primary NAAQS were promulgated to protect the public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas in violation of the NAAQS are designated as nonattainment areas. New sources to be located in or near these areas may be subject to more stringent air permitting requirements. A listing of the NAAQS is presented in Table 3-1. National standards other than annual standards are not to be exceeded more than once per year (except where noted). Based on available ambient air quality data, Fayette County is currently in attainment for all other criteria pollutants (USEPA 2015a).

Table 3-1 National Ambient Air Quality Standards.

Pollutant	Primary and Secondary Standards	Averaging Time	Level	Form
CO	Primary	8-hour 1-hour	9 ppm 35 ppm	Not to be exceeded more than once per year
Lead	Primary and secondary	Rolling 3 month average	0.15 $\mu\text{g}/\text{m}^3$ ⁽¹⁾	Not to be exceeded
NO ₂	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and secondary	Annual	53 ppb ⁽²⁾	Annual mean
Ozone	Primary and secondary	8-hour	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
PM _{2.5}	Primary	Annual	12 $\mu\text{g}/\text{m}^3$	Annual mean, averaged over 3 years
	Secondary	Annual	15 $\mu\text{g}/\text{m}^3$	Annual mean, averaged over 3 years
	Primary and secondary	24-hour	35 $\mu\text{g}/\text{m}^3$	98 th Percentile, averaged over 3 years
PM ₁₀	Primary and secondary	24-hour	150 $\mu\text{g}/\text{m}^3$	Not to be exceeded more than once per year on average over 3 years
SO ₂	Primary	1-hour	75 ppb ⁽⁴⁾	99th Percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year on average over 3 years

Source: USEPA 2016

Abbreviations: ppb = parts per billion, ppm = parts per million, $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

Notes:

⁽¹⁾ Final rule signed on October 15, 2008. The 1978 lead standard (1.5 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$] as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard except that, in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

⁽²⁾ The official level of the annual NO₂ standard is 0.053 parts per million (ppm), equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

⁽³⁾ Final rule signed on March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, the United States Environmental Protection Agency (USEPA) revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

⁽⁴⁾ Final rule signed on June 2, 2010. The 1971 annual and 24-hour SO₂ standards were revoked in that same rulemaking. However, these standards remain in effect until 1 year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

GHGs are chemical compounds in the Earth's atmosphere that trap and convert sunlight into infrared heat. Gases exhibiting greenhouse properties come from both natural and man-made sources. The most common GHGs emitted from natural processes and human activities include carbon dioxide, methane, and nitrous oxide. The primary GHG emitted by human activities in the U.S. is carbon dioxide, representing more than 80 percent of total GHG emissions, which comes mostly from energy use (USEPA 2015b). Agricultural activities also contribute to GHG emissions. Various management practices (e.g., irrigation, tillage, fertilizer application) for agricultural soils can lead to production and emissions of nitrous oxide. Management of agricultural soils accounts for more than half of the agriculture sector emissions, which was 9 percent of the total U.S. GHG emissions in 2013 (USEPA 2015c).

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Selecting the No Action Alternative would not impact air quality at or surrounding the project site. There would be no short- or long-term emissions due to construction or operation of a solar energy system. Ambient air quality would remain unchanged from that which exists currently. In contrast, the No Action Alternative would also not result in a net decrease in criteria pollutants and GHGs due to reduction in the use of off-site fossil fuel-based electricity.

3.6.2.2 Alternative B – Proposed Action Alternative

Minor temporary impacts to air quality associated with the Proposed Action Alternative would occur during the construction phase. Construction activities would result in emissions from construction equipment and vehicles, employee vehicles, and fugitive dust mobilization resulting from grading and vegetation clearing activities and on-site vehicle movement. Vehicles would emit PM, nitrogen oxides, CO, volatile organic compounds, and SO₂ from the combustion of gasoline and diesel fuel. The impacts of these emissions would be negligible and would not adversely affect area air quality. Fugitive dust emissions would be primarily deposited at or in close proximity to the location of project activities and the project site. Best Management Practices (BMPs), including dust suppression using water from nearby non-potable sources, would be employed as necessary to mitigate for dust and other construction-related emissions that could impact localized air quality. WSC would conduct any open burning of tree clearing debris in a manner that promotes good smoke dispersion and in accordance with state open burning requirements. To minimize air quality impacts at the nearby school, no open burning would occur during classes or other activities at the school. Therefore, it is anticipated that air quality impacts associated with construction of the solar energy system would be negligible and limited in duration.

Minor increases in GHG emissions would result from construction activities. The impacts of these GHG emissions would be negligible in comparison to other regional sources of GHG emissions.

The operation of the solar energy system would result in a small increase in the capacity of non-emitting generating sources in TVA's energy resource portfolio and would generate power that otherwise would have been largely generated by the combustion of fossil fuels. Therefore, operation of the proposed solar energy system could result in a minor beneficial impact to air quality and reduced GHG emissions. The adverse impacts of GHG emissions, as well as the beneficial impacts of the anticipated long-term reduction in GHG emissions from generating power, are described in TVA (2015).

3.7 Noise

3.7.1 Affected Environment

Noise is defined as an unwanted sound that can induce hearing loss or interfere with ordinary daily activities, such as communication or sleep. People's reaction to noise varies according to the duration, type, and characteristics of the source; distance between the source and the listener; listener sensitivity; background noise level; and time of day. It is important to keep in mind the distinction between the physical characteristics used to quantify sound levels and the more qualitative or subjective aspects of the person, animal, or object on the receiving end. It is the adverse reaction to sound or the annoyance created by sound that is then defined as noise. Despite the more subjective reaction, however, noise can be measured; that is, sound sources having certain characteristics can reasonably be expected to induce harm or annoyance, and this can be quantified in a statistically meaningful manner. Level of annoyance depends on the intensity, frequency weighting (pitch), and duration of the sound. To quantify noise and describe its effects on the natural and human environment, a basic description of sound terminology is presented below.

As a sound wave moves through the atmosphere, a temporary increase in pressure occurs. It is the pressure change that is detected as sound. The magnitude of the pressure change is the loudness, and the frequency of those temporary changes is the pitch. The healthy human ear detects pressure differences over a wide range of sensitivities. A handy method for comparing these vast pressure differences is to describe them in exponential rather than linear terms. This simplifies the units and more closely depicts the way humans actually perceive sound levels. The decibel (dB) is a logarithmic ratio of the increase in atmospheric pressure a sound event causes compared to a defined reference or baseline pressure.

Because the human ear responds differently to different sound frequencies, the perceived loudness increases far more rapidly than it does for mid-frequency sounds. The sound pressure level represented by a given decibel value is, therefore, typically adjusted to make it more relevant to sounds that the human ear hears especially well. For example, an "A-weighted" decibel (dB[A]) is derived by emphasizing mid-range frequencies to which the human ear responds especially well and de-emphasizing, or penalizing, frequencies lower than 1,000 Hertz and frequencies higher than 5,000 Hertz.

To account for the typically lower levels of background noise at night, community noise levels are usually described using the A-weighted day-night sound level (DNL). DNL is defined as the average sound energy in a 24-hour period with a 10 dB penalty added to the nighttime levels (10:00 p.m. to 7:00 a.m.). DNL is a useful descriptor for noise because it averages ongoing yet intermittent noise, and it measures total sound energy over a 24-hour period.

The Noise Control Act of 1972 directs federal agencies to comply with applicable federal, state, and local noise control regulations. According to the Fayette County Zoning Ordinance, no offensive noise, odor, smoke, dust, dirt, runoff rubbish, heat, glare, or vibration shall be discernible at any lot line in the R-2 and I-L zoning districts. In addition, the ordinance states that no production by any use of noise is permitted which at any boundary of the building site is in excess of the average intensity of street and traffic noise at that boundary (Fayette County 2013). The nearest sensitive noise receptor is the LaGrange-Moscow Elementary School, located approximately 400 to 700 feet to the southwest of the southwestern boundary of the proposed solar energy system.

Given the site setting, typical noise levels would be associated with agricultural farm machinery operating within the project area boundaries and automotive vehicles on TN 57. Typical traffic on TN 57 generates noise levels of approximately 70 dBA at a distance of 50 feet. The USEPA has estimated that farm tractors generate noise levels of 100 dBA at a distance of 50 feet (USEPA 1971). As previously mentioned, there is a sawmill located on the project area; its operation likely generates the highest noise levels in the project area. According to the property owner, this equipment is used very infrequently (once a year at most); therefore, it is not a quantifiable source of noise.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Selecting the No Action Alternative would not increase noise levels at or surrounding the project site. Noise levels would remain unchanged from that which exists currently, which includes usage of farm machinery such as farm tractors and harvesters and traffic on TN 57.

3.7.2.2 Alternative B – Proposed Action Alternative

Construction activities would result in short-term increase in noise levels in the project area. This increase would occur between 7 am and 5 pm, 5 days per week, during the construction period. Noise sources would include variable pitch and volumes from vehicles and equipment involved in site preparation activities and the installation of racking structures. Maximum noise levels for the types of construction equipment expected to be used range from 74 to 101 dBA at a distance of 50 feet (Table 3-2). With multiple pieces of equipment operating concurrently, noise levels would be relatively high during daytime periods at locations within several hundred feet of active construction sites. According to the USEPA, the zone of relatively high construction noise typically extends to distances of 400 to 800 feet from the site of major equipment operations (USEPA 1971).

Table 3-2 Maximum noise levels at 50 feet.

Equipment Type	Maximum Noise Level at 50 Feet (dBA, slow ¹)
Flat Bed Truck	74
Concrete Truck	79
Compactor (ground)	83
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Pickup Truck	75
Grader	N/A
Vibratory Pile Driver	101
Warning Horn	83

Source: USDOT 2015

¹ Slow response as measured on the A scale of a sound level meter or time-weighted average.

The project area is bounded to the southwest and south by the school and residences, respectively, with the nearest receptor being the school located 400 to 700 feet from proposed construction activities. An existing strip of woodland is located between the school and the proposed construction site. This would serve to reduce construction noise at the

school. While construction noise may be heard at the school and nearby residences, due to the distances involved it would likely not disrupt normal activities, would be short-term, and would be restricted to normal weekday work hours. As discussed in Section 3.10, TN 57 would be the nearest route to experience increased traffic associated with the construction activities. The truck and worker traffic on TN 57 would likely not be distinguishable from normal traffic activities during the construction activities.

Construction noise would dominate the soundscape for all on-site personnel. Construction personnel, particularly equipment operators, would use personal hearing protection to limit exposure and ensure compliance with federal health and safety regulations.

Following the completion of construction activities, the ambient sound environment would be expected to return to existing levels. There would be no noise from operating of the solar energy system, with the exception of periodic mowing within the fenceline of the solar energy system to maintain low-growing vegetation. Mowing would occur infrequently and in short duration, and would produce noise similar to existing noises in the surrounding areas such as vehicle traffic, mowers, and farm equipment. The cabinets containing the electrical equipment (inverters and transformers) typically contain any equipment noise. There would be no long-term changes in the noise environment, and overall noise impacts would be insignificant.

3.8 Utilities

3.8.1 Affected Environment

Available utility services in certain portions of the project area include electricity, natural gas, and municipal water and sewer. CEC is the provider of electrical service to all areas in Fayette County (State of Tennessee 2015). The Hardeman-Fayette Utility District supplies natural gas, while the City of Moscow provides water and sewer services to the project area.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, the proposed solar energy system would not be constructed; therefore, there would be no project-related impacts to utilities. The existing land use would be expected to remain the same, and any utilities on site would generally remain unchanged.

3.8.2.2 Alternative B – Proposed Action Alternative

Insignificant impacts to area utilities would result from the Proposed Action Alternative. Water and sewer services in the project area would not be affected. The existing CEC powerline between the solar facility site and the Moscow substation would be rebuilt within its existing ROW to transmit the electricity generated by the facility. CEC and WSC would coordinate the interconnection activities to avoid disruption of service to the surrounding areas. A short, temporary outage may, however be necessary and affected CEC customers would be notified of it before the outage occurs. The electrical line connection to the sawmill and sheds located within the project area would remain. Switchgear at the solar facility point of interconnection would allow the solar facility to be disconnected from the area electrical system in response to an event that would otherwise damage the facility of the area electrical system.

No adverse impacts are expected to result from the Proposed Action Alternative to existing utilities. This alternative would provide for additional capacity and additional renewable energy supply provided by TVA to its customers.

3.9 Waste Management

3.9.1 Affected Environment

This section describes waste (both non-hazardous and hazardous) materials and hazardous wastes associated with the project site and surrounding area. Fayette County currently operates the Fayette County Solid Waste Landfill, which is located along Tennessee Highway 76 (TN 76) about 14 miles from the project area. This landfill is a Class III/IV facility that is permitted to receive solid waste under Tennessee Department of Environment and Conservation Permit No. DML240000080, issued in 1998. Under the terms of the permit, this landfill can accept construction/demolition wastes; shredded tires and waste with similar characteristics; plus landscaping, land clearing, and farming wastes.

Petroleum, oil, and lubricants are not stored within the project area and used periodically in conjunction with ongoing agricultural and tree harvesting activities are stored off site. No staining of surface soils or denuded vegetation associated with release of a hazardous waste, hazardous material, or petroleum products were observed within the project area and surrounding area.

A Phase I Environmental Site Assessment of the project area was completed by Arcadis in July 2015. No contaminated areas or structures containing hazardous materials were identified. An adjacent site located to the south and at a higher elevation than the project area was identified by an Environmental Data Resources (EDR) report as having an NPDES permit for biosolids and having underground storage tanks which are classified as permanently out of use. No spills or discharges are reported for this site in the EDR report. Therefore, it is not anticipated that the presence of these tanks impacts the project area.

In addition, according to the EDR report, a site located adjacent to the southwest of the project area was listed on the National Priorities List until 1996. This site is reported to have had soil contamination associated with the release of several metals (and their associated compounds) including antimony, nickel, copper, zinc, mercury, arsenic, barium, cadmium, chromium, lead, selenium, and silver. The site operated from 1978 until 1987 as an antimony oxide plant. In 1990 the Tennessee Department of Health and Environment signed an order for cleanup of the site. After the site owner unsuccessfully attempted to address the cleanup order's requirements, the case was referred to the USEPA and in 1994 the site was added to the National Priorities List. Delineation of soil contamination and removal of the metal-impacted soils were initiated in 1994 and completed in 1995. Subsequent sampling of the surface soil confirmed that no hazardous substances, pollutants, or contaminants were present at concentrations that would restrict unlimited use of the site, and the site was removed from the list in 1996. Given the previous soil removal activities and current setting, this site does not impact the project site.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Selecting the No Action Alternative would not affect solid or hazardous waste conditions at or surrounding the project site. Potential for impact to hazardous waste would remain unchanged from that which exists currently, which includes the operation of farm machinery.

3.9.2.2 Alternative B – Proposed Action Alternative

The Proposed Action Alternative would result in minor direct and indirect impacts and cumulative impacts related to waste management. Waste would be generated during the construction and operation of the proposed solar energy system and would be handled and disposed of in accordance with local, state, and federal regulations. Construction activities would involve use of machinery (e.g., semi-trucks, field trucks, tractors) fueled by petroleum products. Construction contractors would be responsible for preventing spills by implementing proper storage and handling procedures. There are no environmentally impacted areas within the project or surrounding areas; therefore, construction activities would not exasperate potentially sensitive environmentally impacted areas.

The nearby Fayette County Municipal Solid Waste Landfill would accept construction waste (e.g., wooden crates, cardboard boxes, plastic packaging, excess electrical wiring). Waste associated with construction and operation of the proposed solar energy system would be disposed of in separate dumpsters for metals, wood, and general trash. Pickup would be (at minimum) once a week and more often if necessary. The dumpsters would be located in the on-site construction staging area, and construction crews would have 3-yard trash skips with them when working at remote areas. The generation of waste would be temporary and would result in a minor impact to the landfill due to the disposal of the waste materials. Construction waste materials will be recycled to the extent practicable. Waste generation during operation would be minimal and would mainly result from the replacement of equipment. A decommissioning plan for the proposed solar facility would be developed in order to document the recycling plan of solar facility components and current exemptions from hazardous waste regulations applicable to recycling of such materials. The decommissioning plan would be implemented at the expiration of the PPA, contingent upon the ability and execution of an amended or alternative PPA for the sale of power after the 20-year period.

3.10 Transportation

3.10.1 Affected Environment

Roadways and other transportation infrastructure serving the project and surrounding areas are described in this section. The project area is bounded to the north by a Norfolk Southern railroad line and a short railroad spur terminates in the northwest corner of the project site. TN 57, the main east-west highway in the area, borders the southern boundary of the project site (Figure 1-1). The LaGrange-Moscow Elementary School is located on TN 57 just west of the project site and the section of TN 57 adjoining the project site is within the school zone speed limit area. Liberty Road borders the eastern edge of the project area. A gravel road enters the southern portion of the project site from TN 57. From the intersection of the gravel road with TN 57, TN 57 connects with TN 76 approximately 1.5 miles to the west. TN 76 generally runs in a north-northeast direction and provides regional access to Interstate (I)-40, which is approximately 25 miles from the project area. The TN 57, TN 76, and I-40 route that services the project area is shown on Figure 3-6. Much of the Memphis-bound traffic would typically stay on TN 57 to its intersection with US Highway 72.

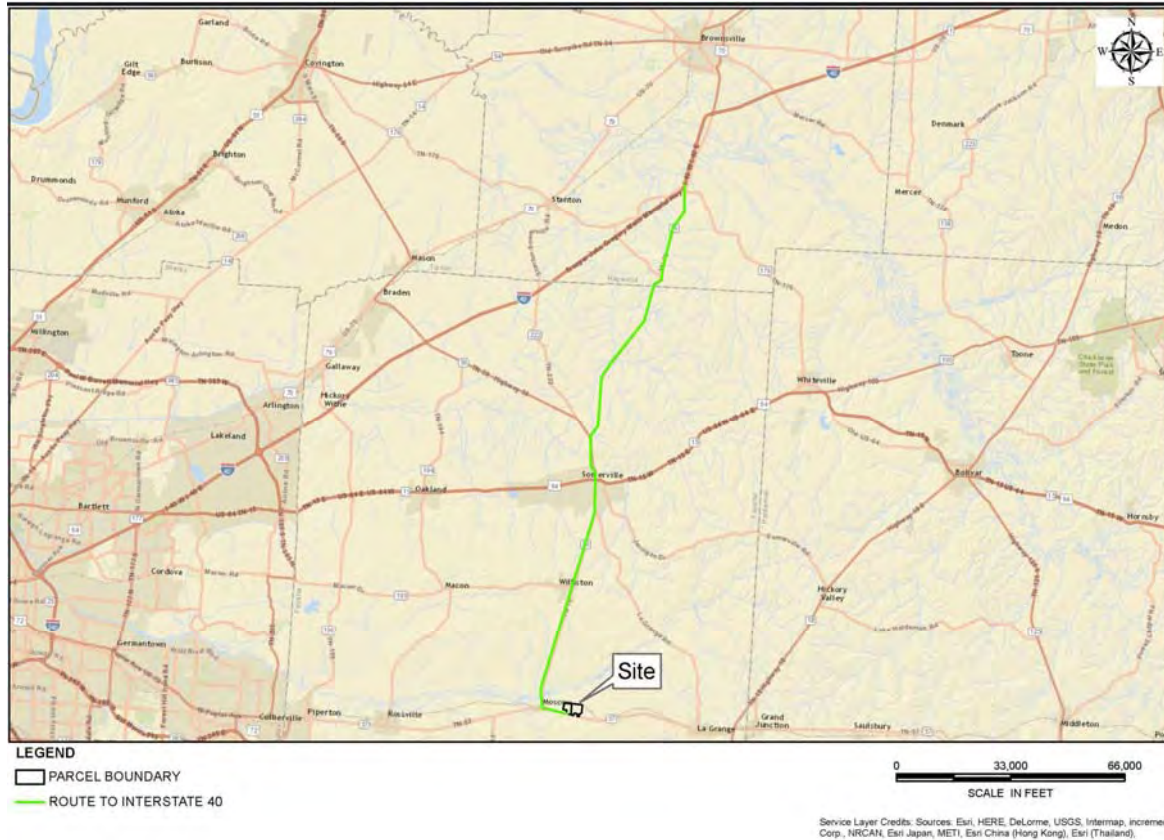


Figure 3-6 Primary traffic route for the project area.

The average annual daily traffic (AADT) is the average number of vehicles traveling along a roadway each day. The Tennessee Department of Transportation has also quantified the highest number of vehicles that travel within a 1-hour period along each roadway (referred to as 'One Way Peak Hour'). These data are summarized for nearby roadways in Table 3-3.

Table 3-3. Existing average annual daily traffic and one-way peak hour traffic on nearby roadways.

Roadway	Average Annual Daily Traffic - 2014	Number of Lanes	One-Way Peak Hour
TN 57 – between junction with TN 76 in Moscow and project site(Station 56)	4,225	2	329
TN 76 – 0.7 miles north of Moscow (Station 57)	2,314	2	143
Interstate 40 – east of junction with SR-59 (Station 74) – approximately 25 miles from project site	29,761	4	997

Source: Tennessee Department of Transportation 2015

3.10.2 Environmental Consequences

3.10.2.1 *Alternative A – No Action Alternative*

Selecting the No Action Alternative would not affect transportation conditions at or surrounding the project site.

3.10.2.2 *Alternative B – Proposed Action Alternative*

Under the Proposed Action Alternative, minor, short-term impacts to traffic on area roadways would occur due to additional vehicles and day-labor traffic during construction. The project would not utilize the railroad adjacent to the project site and there would be no effects on the railroad. The effects on area roadways would be primarily due to worker commutes and delivery of equipment and materials to and from the construction site. On-site construction activities would occur from approximately 7 am to 5 pm, 5 days a week, for approximately 6 months. At peak construction periods, between about 50 and 100 crew members would be on site. A majority of these workers would likely come from the local or regional area, and others would come from outside the region. Workers would either drive their own vehicles or carpool to the project site, and parking would be available on site. Construction equipment and material delivery would require two to five semi-tractor trailer trucks visiting the project site per day for approximately 3 weeks of the construction activities. These larger vehicles would be easily accommodated by existing roadways.

At the peak of construction, there would be a maximum of about 100 to 200 additional vehicle trips per day on TN 57 and TN 76, based on the conservative assumption that the majority of workers drives their own vehicles to the site. This represents maximum increases of approximately 4.8 percent and 8.6 percent to the AADTs for TN 57 and TN 76, respectively. Potential one-way peak hour would increase by approximately 30 percent for TN 57 and 70 percent for TN 76. Although these are sizable increases in one-way peak hour traffic, they are increases over relatively low traffic volumes and are unlikely to result in more than very short traffic delays near the project area. These delays would likely occur at the beginning (7 am) and end (5 pm) of the workday. This impact would be temporary and would end with the construction phase. The existing transportation infrastructure would be sufficient to support the increase in vehicle traffic. Although the effects would be minor, contractors would route and schedule construction vehicles as part of an overall construction management plan, and would strategically locate staging areas in advance at the project site to minimize traffic impacts. All construction vehicles would be equipped with backing alarms, two-way radios, and slow-moving vehicle signs when appropriate. Traffic during facility operation would be minimal and would consist of periodic visits to conduct facility inspections and maintenance. Overall, the Proposed Action Alternative would result in minor, temporary, direct, and indirect impacts during construction, but no cumulative impacts.

3.11 Geology and Soils

3.11.1 Affected Environment

The project area is located in the Gulf Coastal Plain Province within the Mississippi embayment of West Tennessee. This region extends in a wide belt from New Jersey to Texas along the coast of the United States. The rock formations of this region consist of sedimentary rocks from the Cenozoic, tertiary age consisting of sand, silt, clay, and gravel, which were deposited mostly in a marine environment. No sinkholes are known or likely to occur in the project area. The project area is an area of seismic activity associated with the New Madrid fault. The U.S. Geological Survey National Seismic Hazard map for the area

quantifies the potential ground motion as approximately 0.30g (the acceleration due to gravity) with a 2 percent probability of exceedance within 50 years (USGS 2016).

According to the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), a majority of the project area contains silt loam soils (USDA 2015). Loam soils retain nutrients and water while allowing excess water to drain away, making it ideal for agricultural uses. Small portions of the site are classified as gullied soils, which are prone to erosion and often void of vegetation.

Prime farmland, as defined by the USDA, “is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). The soils are of the highest quality and can economically produce sustained high yields of crops when treated and managed according to acceptable farming methods.” Approximately 53 percent (184 acres) of the property is designated as prime farmland (Figure 3-7). The soil types on the project area considered prime farmland are Henry silt loam, Calloway silt loam, Falaya fine sandy loam, Grenada silt loam, Loring silt loam, and Memphis silt loam.



Figure 3-7. Prime farmland classification within the project area.

3.11.2 Environmental Consequences

3.11.2.1 *Alternative A – No Action Alternative*

Under the No Action Alternative, there would be no project-related impacts to geology or soils and current soil erosion rates and soil productivity would likely remain unchanged unless the management of the area changes.

3.11.2.2 *Alternative B – Proposed Action Alternative*

The Proposed Action Alternative would result in minor, temporary, direct and indirect soil impacts and a temporary loss of agricultural production. No impacts to area geology are anticipated and the facility would be constructed to meet applicable seismic standards. Under both solar facility options, portions of the project site would be graded during construction. As a result, there would be a slight increase in erosion and sedimentation. The creation of new impervious surfaces, in the form of equipment pads, would result in a slight increase in stormwater runoff and the potential for soil erosion. The use of BMPs would minimize the potential impacts. These measures may include the use of berms, sediment basins, fiber mats, fencing, netting, gravel, mulches, grasses, slope drains, and other erosion control features to ensure economical, effective, and continuous erosion control during construction and post-construction activities. As discussed in Section 1.3, an NPDES Permit for discharges of stormwater associated with construction activities would be required. As a part of the NPDES application process, a Stormwater Pollution Prevention Plan (SWPPP) would be developed to identify the necessary management practices that would be employed during construction to mitigate potential impacts.

The NRCS uses a land evaluation and site assessment system to establish a farmland conversion impact rating score. This score is used as an indicator for the project stakeholders to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended threshold level (USDA 2014). The construction and operation of the proposed solar energy system would potentially impact/convert prime farmland. There are approximately 208,931 acres of prime farmland in Fayette County, which is approximately 46 percent of the total land area in the county. The conversion of the maximum of 135 acres (under Option 2) into the solar energy system represents 0.06 percent of the total available farmland in the county. On August 18, 2015, the USDA issued a letter that similar Proposed Actions in this region were exempt from further Farmland Protection Policy Act assessment (Appendix A). This was based on the fact that, while agricultural production would cease on the project site, long-term impacts to prime farmlands and soil productivity on the site would be insignificant, and the site could be readily returned to agricultural production once the solar farm is dismantled. Based on the limited site disturbance and USDA findings, there would be insignificant effects on prime farmland under the Proposed Action Alternative. Because the construction and operation of the solar farm is unlikely to affect land uses elsewhere in the surrounding area, no cumulative impacts on prime farmland are anticipated.

3.12 Surface Water

3.12.1 Affected Environment

The project area is located within the Wolf River basin in Fayette County, Tennessee. In April and May 2015, Arcadis personnel conducted a field survey that identified nine streams within the project area (Figure 3-8). The surface water features mostly follow the topography of the project and surrounding areas. Due to previous grading of the site to improve agricultural production and reduce soil erosion, many of the streams and drainage features are intertwined with wetlands throughout the project area. Many ephemeral

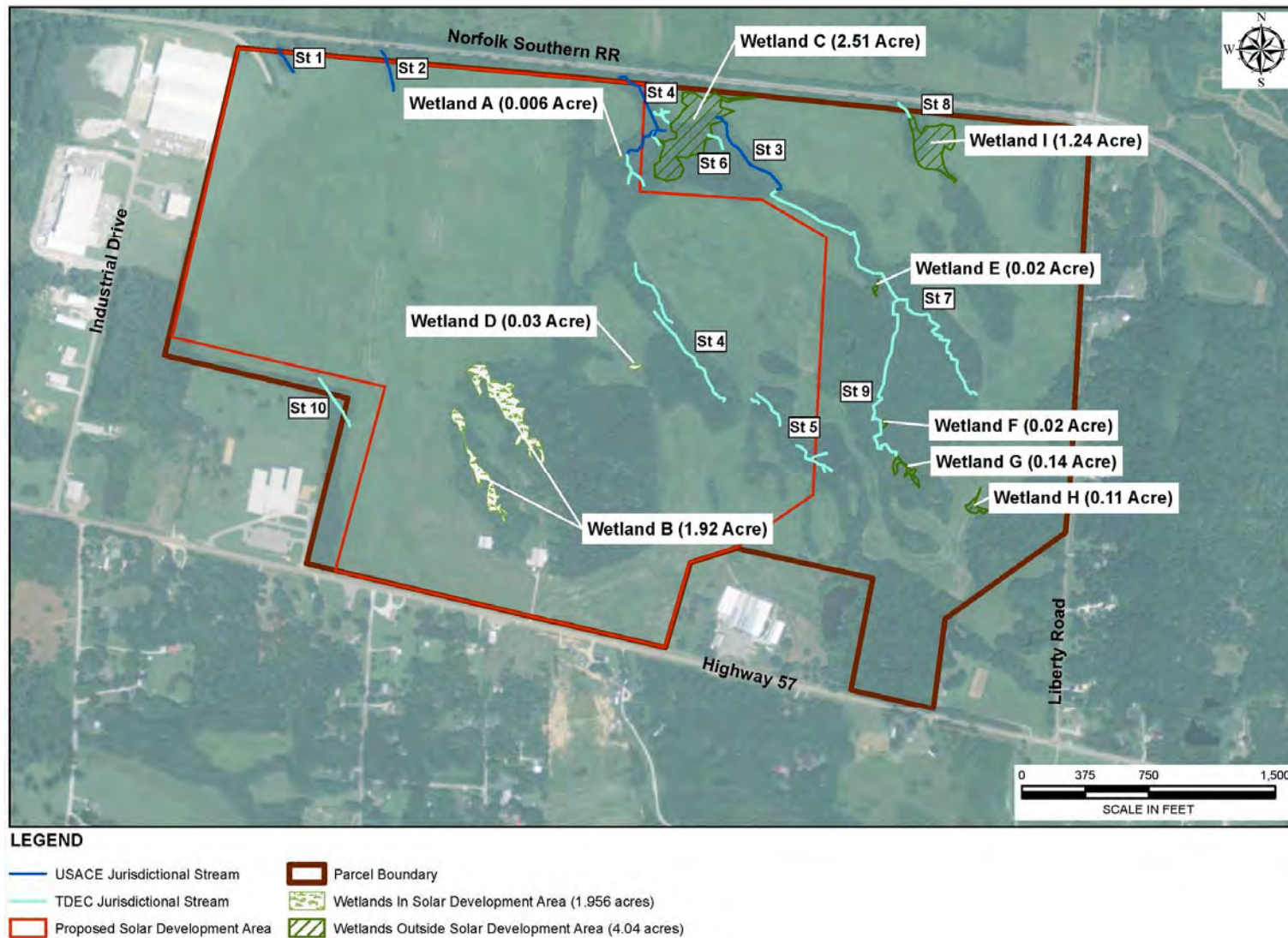


Figure 3-8. Streams (St 1 – St 10) and wetlands (A – I) in the project area.

streams flow into wetlands as streams lose channelization or encounter man-made berms. A majority of the identified streams are located within the forested areas of the project area as shown on Figure 3-8.

All of the streams in the project area flow in a northerly direction, with a majority of the streams discharging into a perennial stream located north of the project area. This off-site stream flows west, parallel to the railroad tracks and through a culvert under the railroad tracks. It continues to flow west, under a bridge on TN 76, and into the North Fork Wolf River. The North Fork Wolf River is not listed as impaired according to the 2014 303(d) list (Tennessee Department of Environment and Conservation 2014). The streams in the project area are described in more detail below.

- Stream 1 is an intermittent stream in a small forested area in the northwestern corner of the project area. The stream flows northwest across the site boundary and discharges into an off-site stream. Stream 1 is located within the proposed facility fenceline for Options 1 and 2.
- Stream 2 is an intermittent stream located the forested northwestern portion of the project area. The stream flows northwest and discharges into an off-site stream. The southern portion of Stream 2 is within the proposed facility fenceline for Option 2.
- Stream 3 is an intermittent stream in a narrow forested area in the north-central of the site and flows into Wetland C.
- The northern section of Stream 4 is intermittent and perennial stream on the northern boundary of the central portion of the site. Several ephemeral streams / wet weather conveyances drain into its main channel. The stream flows north and discharges into an off-site stream. Portions of the northern section of Stream 4 are located within the proposed facility fenceline for Option 2.
- The southern section of Stream 4 (see Photograph 8) is an ephemeral stream / wet weather conveyance in the central portion of the site. It flows northward through a forested area and parts of its channel are poorly defined.
- Stream 5 (see Photograph 9) is an ephemeral stream / wet weather conveyance located on the east-central border of the site within a narrow forested area. The stream drains the forested area and surrounding agricultural fields and connects to Stream 4.
- Stream 6 is an ephemeral stream / wet weather conveyance located outside of the proposed project development area. It conveys water from the surrounding agricultural fields within through a forested area.
- Stream 7 (see Photograph 10) is an ephemeral stream / wet weather conveyance located east of the proposed project fenceline in a forested area. It flows northwest into Stream 3.
- Stream 8 is a forested, ephemeral stream / wet weather conveyance fed by Wetland I and located northeast of the proposed project fenceline. The stream flows northwest and exits the property via a culvert under the railroad tracks to connect to

a forested tributary to the North Fork Wolf River. Stream 8 is connected to Wetland I.

- Stream 9 is a forested, ephemeral stream / wet weather conveyance located east of the proposed project fenceline. It flows north and connects to Stream 7.
- Stream 10 is an ephemeral stream / wet weather conveyance that flows northwest out of an agricultural field, into a forested area, and back into an agricultural field. It is located on the southwest site boundary outside of the proposed fenceline.



Photograph 8. Stream 4 southern section – Facing south (upstream).



Photograph 9. Stream 5 – Facing southeast.



Photograph 10. Stream 7 – Facing southeast.

3.12.2 Environmental Consequences

3.12.2.1 *Alternative A – No Action Alternative*

Under the No Action Alternative, existing resource trends would continue to occur. Limited amounts of soil erosion would be expected to continue along the water features within the project area. No project-related direct, indirect, or cumulative impacts to surface water resources would occur under this alternative.

3.12.2.2 *Alternative B – Proposed Action Alternative*

The Proposed Action Alternative would result in minor, temporary, direct, and indirect surface water impacts to streams located within the proposed project site development area during construction. Under both options, the site grading would result in a slight increase in erosion and sedimentation potentially affecting Streams 1 and 2, and for Option 2, Stream 4. Grading activities would be completed outside of all identified stream beds. Racking and fence posts would be driven throughout the footprint of the proposed project site development areas. The solar energy system would be designed to avoid installing all racking and fence posts within all stream beds, in particular Streams 1, 2 and 4.

The creation of new impervious surface, in the form of gravel access road improvements and concrete equipment pads, would result in a negligible increase in stormwater runoff and associated soil erosion entering streams. Solar panels would be spaced to minimize heavy sheeting of water from the panel surfaces. Sediment control measures (e.g., silt fencing) would be implemented along all streams. These measures would minimize the potential impacts to all streams, in particular the ephemeral and perennial streams located outside of the graded and development areas. After construction of the solar facility, the site would be maintained with a permanent cover crop that would result in a small, long-term beneficial impact to surface water quality by reducing the runoff of sediment and agricultural chemicals from the former farmland.

As discussed in Section 3.2.2, an NPDES permit for discharges of stormwater associated with construction activities would be required. As a part of the NPDES application process, a SWPPP would be developed to identify the necessary management practices that would be employed during construction. With the proper implementation of BMPs and adherence to the provisions of required state permits (e.g., NPDES permit), implementation of the Proposed Action Alternative would result in minor, temporary, direct, and indirect adverse surface water impacts during construction. As mentioned above, there would be small, beneficial, long-term impacts to surface water during operation of the solar energy system.

3.13 Wetlands

3.13.1 Affected Environment

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 are also found along the edges of most watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits including flood/erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

In April and May 2015, Arcadis personnel conducted a wetland delineation survey within the project area. The wetland delineation was conducted in accordance with applicable Clean Water Act standards. Eighteen wetlands with a total area of 39.65 acres were delineated within the project area (Table 3-4, Figure 3-8). Pending review by the U.S. Army Corps of

Engineers, these wetlands are considered potentially jurisdictional. Jurisdictional wetlands are defined by 33 CFR Part 328.3(b) and are protected by Section 404 of the Clean Water Act (33 USC 1344).

A TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA regions (Tennessee Valley Authority Rapid Assessment Method [TVARAM]) was used to categorize wetlands within the proposed development area by their functions, sensitivity to disturbance, rarity, and ability to be replaced. The categorization was used to evaluate impacts and to determine the appropriate levels of mitigation, if necessary. TVARAM scores are used to classify wetlands into three categories. Category 1 wetlands are considered “limited quality waters.” They represent degraded aquatic resources having limited potential for restoration with such low functionality that lower standards for avoidance, minimization, and mitigation can be applied. Category 2 includes wetlands of moderate quality and wetlands that are degraded but which carry reasonable potential for restoration. Category 3 generally includes wetlands of very high quality or of regional/statewide concern, such as wetlands that provide habitat for threatened or endangered species. Avoidance and minimization are the preferred mitigation measures for Category 2 and 3 wetlands.

Table 3-4. Wetlands within the project area.

Wetland Identifier	Type¹	TVARAM Score	Wetland Total Acreage
Wetland A	PEM1Ef	Category 1 (14)	0.006
Wetland B	PFO1F	Category 2 (48)	1.92
Wetland C	PFO1Ed/PEMBf	--	2.51
Wetland D	PEM1Hh	Category 1 (23)	0.03
Wetland E	PFO1B	--	0.02
Wetland F	PFO1B	--	0.02
Wetland G	PFO1B	--	0.14
Wetland H	PFO1Efh	--	0.11
Wetland I	PFO1E/PEM1f	--	1.24
Total			39.64

¹ Type Classifications (Cowardin et al. 1979 PEM1=Palustrine, emergent, persistent vegetation; PFO1=Palustrine forested wetland, broad-leaved deciduous; B=saturated; E=seasonally flooded/saturated; F=semi-permanently flooded; H=permanently flooded; d=partially drained/ditched; f=farmed; h=diked/impounded.

Nine wetlands with a total area of 6.01 acres are located within the project area. Three of these wetlands, with a total area of approximately 1.96 acres, are within the proposed solar facility site boundary. The following further describes these three wetlands:

- Wetland A (PEM1Ef) is an 0.006-acre semi-permanently flooded wetland beginning in the west-central area of the site in two broad-leaf deciduous forested areas. This wetland is surrounded by typical hardwood tree species including black oak, flowering dogwood, willow oak, American elm, and winged elm. The wetland is a small depression where water accumulates but no vegetation is growing within the wetland. The surrounding canopy cover includes cherrybark oak, red maple, and sweetgum trees. The wetland abuts Stream 4.

- Wetland B (PFO1F) is a 1.92-acre semi-permanently flooded/saturated forested seep wetland within a mixed deciduous forest. Dominant vegetation includes cherrybark oak, flowering dogwood, willow oak, sweetgum, and American elm. The wetland drains to the north into the adjacent agricultural fields.
- Wetland D (PEM1Hh) is a 0.03-acre permanently flooded, emergent wetland with persistent vegetation located in a diked or impounded depression in an active agricultural field in the middle of the site. Dominant vegetation includes several sedge species including foxtail sedge and spikerush.

3.13.2 Environmental Consequences

Wetlands are protected under Section 404 of the Clean Water Act and by EO 11990. In order to conduct specific activities in wetlands, authorization under a Section 404 permit from the USACE is required depending on the wetland's size and hydrologic connectivity to a navigable waterway. EO 11990 requires all federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

3.13.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to wetlands.

3.13.2.2 Alternative B – Proposed Action Alternative

The Option 1 single-axis tracking solar facility has been designed to avoid direct impacts to wetlands. Erosion and sedimentation BMPs, including, for example, the establishment of buffers and installation of silt fencing, would be used to minimize indirect impacts from sediment runoff. Option 1 would have minor indirect and no cumulative impacts on wetlands.

Under Option 2, the proposed solar energy system would affect up to approximately 1.96 acres of wetlands. Portions of the facility fencing would be constructed through the 0.006-acre emergent Wetland A. In order to reduce shading of the PV panels and the resulting loss of electricity generation, trees would be removed from the 1.92-acre forested Wetland B and the 0.03-acre forested Wetland D. No grading would occur in any of the wetlands. The trees would be felled using chain saws and the stumps would be left in place. During the operation of the solar facility, trees would be periodically re-cleared from these wetlands, resulting in their conversion from forested wetlands to scrub-shrub wetlands. The conversion of these Category 2 moderate quality wetlands from forested to scrub-shrub wetlands would alter their plant and animal communities but would have little impact on their hydrology.

No construction vehicles or mechanized equipment would operate in the wetlands. Depending on the final design, buried electrical conduits could cross Wetlands A and D. These would be installed using directional drilling from the surrounding areas instead of trenching. The only fill material that would be permanently placed in the wetlands would be fence posts which would occupy a negligible area under both options. On October 30, 2015, Arcadis contacted Mr. Tim Flinn of the USACE Memphis District regarding the placement of fence posts in wetlands. According to Mr. Flinn, USACE does not consider posts to count as an impact unless they are acting as a fill, and he agreed that the driving of fence posts should not be considered a fill (USACE 2015). Mr. Flinn also confirmed that clearing may occur within the wetland as long as grubbing or ground disturbance does not

occur. In addition, shading of wetland vegetation by PV panels is not considered a wetland impact according to USACE (USACE 2015).

The impacts to wetlands under the Option 2 facility layout would likely require an Individual Aquatic Resource Alteration Permit issued by TDEC as well mitigation to offset the impacts of the conversion from forested to scrub-shrub or herbaceous wetlands. WSC does not, at this time, proposed to construct the facility according to the Option 2 layout and has therefore not applied for the permit or identified the appropriate mitigation. Should WSC change its preference to the Option 2 facility layout, construction activity would not begin until WSC has obtained the necessary TDEC permit and TDEC and TVA has approved any necessary wetland mitigation.

In order to minimize impacts to wetlands, erosion and sedimentation BMPs such as the installation of silt fencing and other measures specified in the SWPPP would be implemented throughout the construction period. The solar generation facility has been designed to minimize potential impacts to wetlands. Impacts to wetlands would be avoided for the Option 1 facility. Complete avoidance of impacts to wetlands is not practicable for the Option 2 facility due to siting and engineering constraints, and the impacts of tree clearing and constructing fencing within wetlands would be insignificant. Accordingly, the proposed action would be consistent with EO 11990.

3.14 Vegetation

3.14.1 Affected Environment

The project area is located within the Loess Plain sub-ecoregion of the Mississippi Valley Loess Plains ecoregion (USEPA 2012). This ecoregion stretches from near the Ohio River in western Kentucky to Louisiana. It consists primarily of gently rolling, irregular plains, with oak-hickory and oak-hickory-pine natural vegetation. The region is dominated by agriculture, and most of the forest cover has been removed to create cropland.

Much of the project area consists of low, rolling hills covered by grasslands supporting a variety of grasses and forbs. These fields have been managed for hay in recent years. The eastern portion of the project area is a mix of hayfields and wooded areas. Deeply incised streams with standing water or ponded areas run through the woodlands. The western portion of the project area is mostly hayfields.

According to aerial photography and site surveys, approximately 32 percent (114 acres) of the project area is forested. The forested areas are located throughout the project area with larger stands in the central portion and eastern half of the property, mostly surrounding wetlands and streams. Strips of woodland occur along much of the property border. Most of the forested areas are oak-dominated and contain black, southern red, and white oak, eastern red cedar, honey locust, winged elm, red maple, tulip poplar, American sycamore, and sweet gum. Loblolly pine plantations occur in the south-central portion of the project area and in a strip along the western boundary. The forested areas have a relatively open understory. No unique plant communities were observed during field surveys.

EO 13112 serves to prevent the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that those species potentially cause. In this context, invasive species are non-native species that invade natural areas, displace native species, and degrade ecological communities or ecosystem processes (Miller et al. 2010). Much of the project site contains invasive species (e.g.

Japanese honeysuckle, field clover, and Chinese privet), which reflects the frequency and magnitude of disturbance present on site. Disturbances associated with activities such as agriculture can encourage invasion and establishment of weedy plants.

3.14.2 Environmental Consequences

3.14.2.1 *Alternative A – No Action Alternative*

Under the No Action Alternative, there would be no project-related impacts to vegetation.

3.14.2.2 *Alternative B – Proposed Action Alternative*

Implementation of the Proposed Action Alternative would result in minor adverse direct, indirect, and cumulative impacts to vegetation within the project area. Under both options, tall vegetation, shrubs, and trees would be removed and much of the facility site would be graded. Under Option 1, approximately 0.44 acres of hardwood forest would be cleared (Figure 3-9). Following construction, the site would be revegetated with grass or other low-growing vegetation. All revegetation, under both options, would utilize native or non-invasive plants.

Under Option 2, about 43 acres of upland forest and 1.92 acres of forested wetlands would be cleared to install the proposed solar energy system (see Figure 3-10). Following construction, the upland cleared areas would be revegetated with grass and the wetland areas would be allowed to naturally revegetate. The forested communities to be cleared are mostly planted pine forest and hardwood forest greatly altered following many years by agricultural practices on the surrounding land and by encroachment of invasive species.

The agricultural and forested plant communities affected by construction under both options are common and well represented throughout the region. Although Option 2 would result in loss of a considerably larger area of forest than Option 1, the loss of forest would have insignificant local and regional impacts. Under both options, the solar facility sites would be maintained by routine mowing during the operation of the facility. This would result in the establishment of a permanent cover of a mix of grasses and herbaceous vegetation within most of the facility site. Under Option 2, the herbaceous wetland habitats may transition over time to hosting more shade-tolerant species on the in the area of the PV arrays.

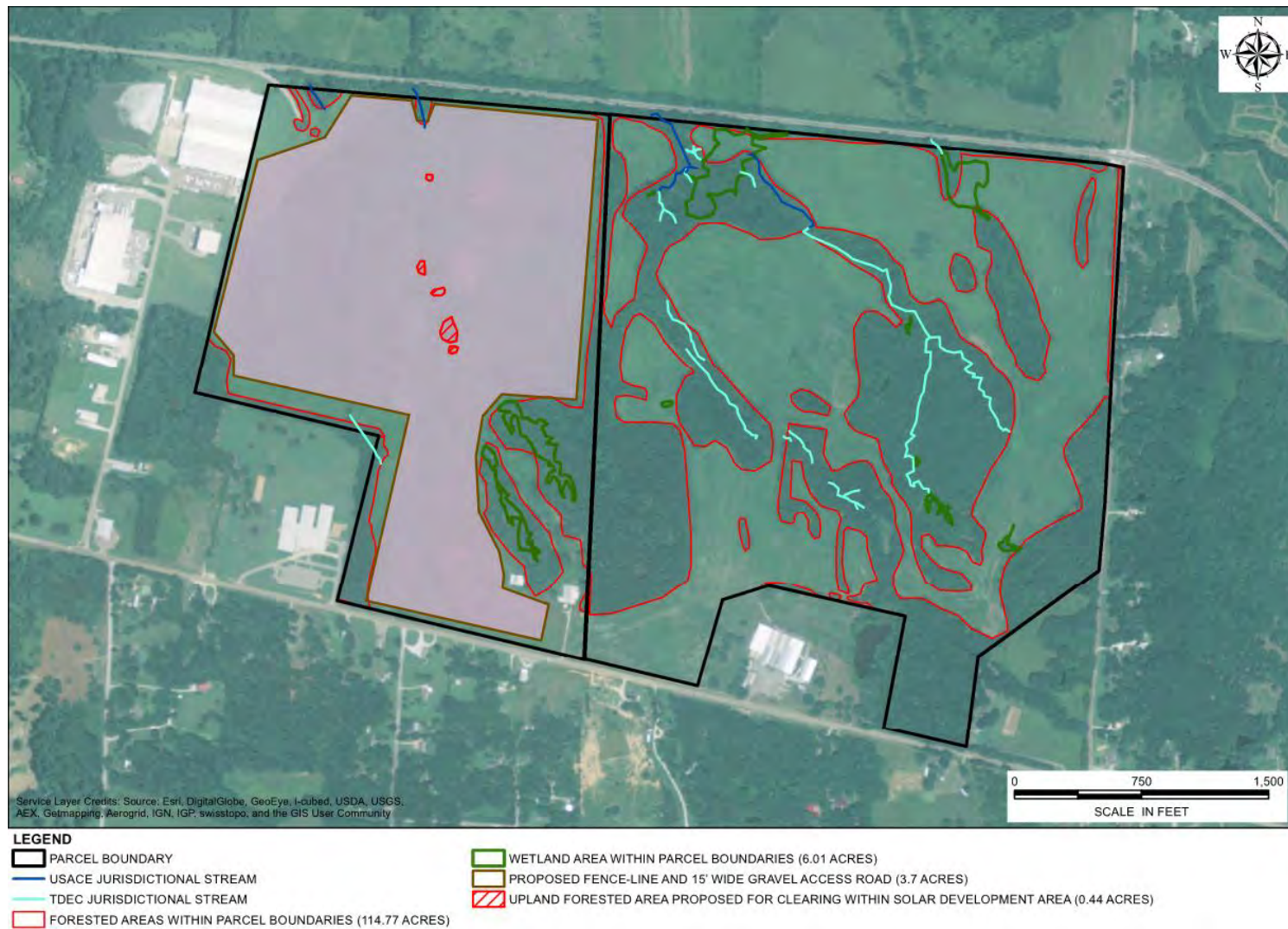


Figure 3-9. Forested areas within the Option 1 project area.

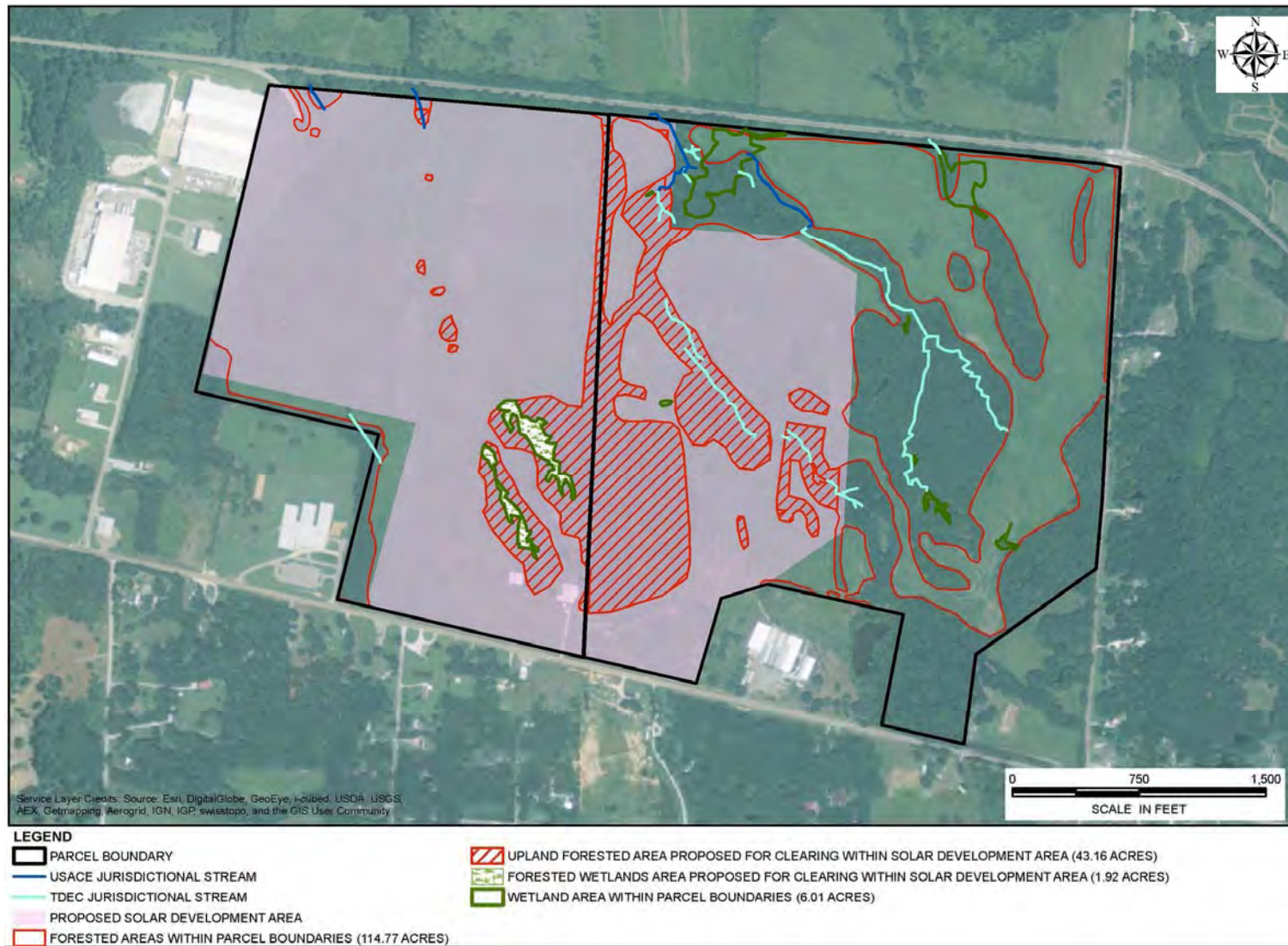


Figure 3-10 Forested areas within the Option 2 project area

3.15 Wildlife

3.15.1 Affected Environment

The wildlife in the oak-hickory ecosystem is highly diverse. The wildlife that would be found within and surrounding the project site are those adapted to disturbance and presence of human activity that is typically found in rural, agricultural areas. Examples of typical wildlife that could be found include American crow, Carolina chickadee, tufted titmouse, American goldfinch, red-bellied woodpecker, downy woodpecker, eastern meadowlark, red-winged blackbird, groundhog, eastern chipmunk, eastern gray squirrel, ring-necked snake, gray rat snake, five-line skink, copperhead snake, spring peeper, and upland chorus frog (Whitaker and Hamilton 1998, LeGrand 2005; Niemiller et al. 2013).

During the April 2015 field survey, Arcadis biologists observed various wildlife species including northern cardinal, mourning dove, dickcissel, eastern kingbird, indigo bunting, summer tanager, red-winged blackbird, red-bellied woodpecker, turkey vulture, and red-tailed hawk. Several species of amphibians were observed on site including chorus frog and spring pepper, as well as reptile species black rat snake, anole, box turtle, and water turtle. Mammal species or evidence noted on site were squirrel, raccoon, eastern cottontail, and white-tailed deer. A honey bee hive was observed within an oak tree located in the vicinity of the sheds. No unique or rare wildlife habitat was observed within the project site.

3.15.2 Environmental Consequences

3.15.2.1 *Alternative A – No Action Alternative*

Under the No Action Alternative, there would be no project-related impacts to wildlife or their habitats.

3.15.2.2 *Alternative B – Proposed Action Alternative*

There would be minor adverse impacts on the wildlife in the project area under the Proposed Action Alternative. Under both facility design options, most of the affected area is agricultural fields supporting a low diversity of wildlife. Under Option 1, a small area, approximately 0.44 acres, of forest would be cleared (Figure 3-9). Under Option 2, a larger area of forest including up to 43 acres of upland forested habitat and 1.92 acres of forested wetlands would be cleared (Figure 3-10), resulting in greater impacts to wildlife than Option 1. During construction, much of the wildlife would be eliminated or displaced from the project site. Some of the displaced wildlife would likely move to similar habitats surrounding the project site. The wildlife species in the project area are generally common in the region and impacts on their regional populations would be insignificant. Following construction, the cleared areas would be revegetated with grass and maintained as grassland during the operation of the solar energy system. While this would provide habitat for many wildlife species adapted to grassland habitats, the presence of the solar panels would likely limit the use of the site by some wildlife species. Overall impacts to wildlife would be insignificant and no adverse cumulative impacts would occur.

3.16 Threatened and Endangered Species

The Endangered Species Act (ESA) requires federal agencies to conserve species listed as endangered or threatened and to determine the effects of their proposed actions on listed species and their critical habitat. Endangered species are those determined to be in danger of extinction throughout all or a significant portion of their range. Threatened species are those determined to be likely to become endangered within the foreseeable future. Section 7 of the Endangered Species Act requires federal agencies to consult with the USFWS

when their proposed actions may affect endangered or threatened species and their critical habitats.

3.16.1 Affected Environment

Federally listed species potentially occurring within the project area were determined through a search of the Initial Project Scoping feature of the USFWS Information, Planning, and Conservation System (IPaC 2013; USFWS 2014). State-listed species were determined through a quadrangle search of the Tennessee Department of Environment and Conservation (TDEC), Natural Heritage Inventory Program's Interactive Rare Species Database (TDEC 2014). These databases indicated that two federally listed species and nine state-listed species could occur within the project site (Table 3-5).

No habitat for the state-listed aquatic species (fatmucket, southern rainbow, and piebald madtom) occurs within or immediately downstream of the project site. No mud flats occur within the project site; therefore, habitat for the multiflowered mud-plantain and blue mud-plantain is not present. No habitat to support the southern bog lemming is located within the project site.

Table 3-5 Federal and State Listed Species in the Vicinity of the Project Site

Common Name	Scientific Name	Federal Status ¹	State Status (Rank ²)
Mussels			
Fatmucket	<i>Lampsilis siliquoidea</i>		No status (S2)
Southern rainbow	<i>Villosa vibex</i>		No Status (S2)
Fish			
Piebald madtom	<i>Noturus gladiator</i>		NMGT (S3)
Mammals			
Indiana bat	<i>Myotis sodalis</i>	END	END (S1)
Northern long-eared bat	<i>Myotis septentrionalis</i>	THR	NMGT (S4)
Southern bog lemming	<i>Synaptomys cooperi</i>		NMGT (S4)
Southeastern shrew	<i>Sorex longirostris</i>		NMGT (S4)
Meadow jumping mouse	<i>Zapus hudsonius</i>		NMGT (S4)
Plants			
Cluster fescue	<i>Festuca paradoxa</i>		S (S1)
Multiflowered mud-plantain	<i>Heteranthera multiflora</i>		S (S1)
Blue mud-plantain	<i>Heteranthera limosa</i>		THR (S1S2)

¹Status abbreviations: END=Endangered, THR = Threatened, NMGT=In need of management, S = Special concern

²State rank abbreviations: S1 - critically imperiled with five or fewer occurrences; S2 = very rare and imperiled within the state, 6 to 20 occurrences or fewer; S3=Rare or uncommon with 21 to 100 occurrences, S4=Apparently secure.

During winter, Indiana bats hibernate in caves and mines located in karst areas of the United States. In summer, it uses a variety of forest habitats for roosting, foraging, and raising young (USFWS 2014). Potential roost sites are located under the exfoliating bark, cracks, crevices, and/or hollow live trees or snags greater than 5 inches in diameter at breast height (dbh). Roost trees are typically within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones,

bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

Similar to the Indiana bat, the northern long-eared bat hibernates in caves and mines in the winter. During summer, the northern long-eared bat roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees and/or snags typically 3 inches dbh or greater (USFWS 2014). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat selects roost trees based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. These bats emerge at dusk to forage in upland and lowland woodlots and tree-lined corridors, feeding on insects (USFWS 2014). Suitable summer habitat consists of a wide variety of forested/wooded habitats and may also include some adjacent and interspersed non-forested habitats, such as emergent wetlands and adjacent edges of agricultural fields. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Typical summer habitat is occupied from mid-May through mid-August each year (USFWS 2014).

No known maternity roosts or caves occupied by the Indiana bat or northern long-eared bat have been recorded in Fayette County, Tennessee. In April 2015, a Phase 1 Indiana and northern long-eared bat habitat assessment was conducted on the project site by Arcadis to determine the availability of suitable summer habitat for these listed species. Surveys were conducted in accordance with the 2015 Range-wide Indiana Bat Summer Survey Guidelines (USFWS 2015). The survey identified approximately 45 acres of forest in the combined Option 1 and Option 2 project area (Figure 3-10), of which approximately 33 acres were identified as moderately suitable for summer roosting habitat for the two bat species. The two pine-dominated forested areas on the project site are not suitable habitat for the bats.

The cluster fescue is adapted to a wide range of habitats and environmental conditions. This species can be found in unplowed upland prairies, prairie draws, savannas, forest openings, and glades (Aiken et al. 1996). Potential habitat for this species may occur within the moist woods located on the project site. No individuals were observed during the April 2015 site visit.

Southeastern shrew is found in various habitats including wet meadows, damp woods, and uplands. This species is found throughout the State of Tennessee. Potential habitat for this species may occur within the wet meadows located in the open agricultural fields and within the damp forested areas within the project area.

Meadow jumping mouse is found in open grassy fields, often abundant in thick vegetation near water bodies. This species is found throughout the State of Tennessee. Habitat for this species may occur within the thick vegetation areas surrounding wetlands within the project area.

3.16.2 Environmental Consequences

3.16.2.1 *Alternative A – No Action Alternative*

Under the No Action Alternative, TVA would not purchase power from the proposed solar energy system, which would not be constructed or operated. Environmental conditions on the property would remain the same. Therefore, there would be no direct, indirect, or cumulative impacts to threatened and endangered species are anticipated.

3.16.2.2 Alternative B – Proposed Action Alternative

The construction of the proposed solar facility would affect the Indiana and northern long-eared bats by clearing 0.44 acres of forested summer roost habitat for Option 1 and 32.68 acres of forested summer roost for Option 2. TVA has determined that this clearing would result in minor indirect and cumulative effects to the two bats and consulted in May 2016 with the USFWS under Section 7 of the Endangered Species Act on these effects (Appendix A). No other federally listed endangered or threatened species would be affected. TVA initially consulted with USFWS in February 2016 on the effects of clearing the larger area of forested summer roost habitat that would have been affected by the Option 1 facility layout as described in the draft of this EA. Due to WSC's stated intention to construct the Option 1 single-axis tracking facility, the May 2016 consultation addressed the revised Option 1 facility design and the associated effects to 0.44 acres of forested summer roost habitat. Should WSC change its preference and propose to construct the Option 2 facility, TVA would reinstate consultation with the USFWS.

In accordance with the USFWS 2015 *Conservation Strategy for Forest-Dwelling Bats in Tennessee* and associated Interim Compliance Process, TVA and WCS would avoid adverse effects to roosting bats by not cutting potential roost trees between April 1 and July 31 and by contributing \$1,606 to Tennessee's Imperiled Bat Conservation Fund to offset the loss of forest. WCS has made this contribution. In a letter dated June 13, 2016, the USFWS concurred that the proposed action, with the implementation of these conservation measures, would not likely to jeopardize the continued existence of the two listed bats or result in the destruction or adverse modification of their designated critical habitat and that the requirements of Section 7 of the ESA are fulfilled.

Negligible impacts to the state-listed cluster fescue, southeastern shrew, and meadow jumping mouse would occur from the installation of fencing and tree clearing in wetlands under Option 2. There is no suitable habitat for the piebald madtom within the project area.

3.17 Unavoidable Adverse Environmental Impacts

The Proposed Action could cause some unavoidable adverse environmental effects. Specifically, construction activities would increase noise and traffic as well as impact the aesthetics of the general area. The existing tree lines and distances of the proposed activities from sensitive receptors would limit this impact. Construction activities would be limited to daytime hours, which would help minimize noise impacts during construction. Transportation impacts during construction would be minimized by development of an overall construction management plan that would route and schedule construction vehicles as well as strategically locate staging areas in order to ensure that impacts are minor. Streams, wetland, and sensitive forested habitats will experience various levels of impact. Prior to construction activities, the avoidance areas will be surveyed, and proper BMPs will be implemented. With the application of appropriate and standard environmental safeguards, such as those described above, these unavoidable adverse effects are expected to be minor.

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

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and uses of water resources. Long-term productivity is the capability of the land to provide resources, both market and non-market, for future generations.

In this context, long-term impacts to site productivity would be those that last beyond the life of the project. The Proposed Action would affect long-term productivity by construction of the solar power generation facility. These actions would remove the land from agricultural production and cover a very minimal portion of the site with impervious surfaces. Portions of the site would remain vegetated and productive. Construction activities would cause a minor, short-term loss of wildlife habitat.

3.19 Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources would occur when resources would be consumed, committed, or lost because of the project. The commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project and possibly beyond.

Construction and operation activities would result in an irretrievable and irreversible commitment of natural and physical resources. The implementation of the Proposed Action Alternative would involve irreversible commitment of fuel and resource labor required for the construction, maintenance, and operation of the solar energy system. It would also involve the irretrievable commitment of agricultural and forested areas within the Project Area for the life of the solar energy system. Because removal of the solar arrays and associated on-site infrastructure could be accomplished rather easily, and the facility would not irreversibly alter the site, the project site could be returned to its original condition or used for other productive purposes once it is decommissioned.

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Appendix A – Correspondence



United States Department of Agriculture

Date: August 18, 2015

Brian Maillet
ARCADIS
114 Lovell Road, Suite 202
Knoxville, Tennessee 37934

Re: Proposed Providence Solar Center in Madison County, Tennessee

Mr. Maillet,

I have reviewed your request for a Farmland Protection Policy Act (FPPA) assessment on the above-mentioned project. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to non-agricultural use and are completed by a Federal agency, or with assistance from a Federal agency.

Given the type of project (Solar Energy), and how the project is implemented, leads me to conclude that this project does not permanently convert farmland. Given that the project could be removed and normal farming practices resume on the site without much difficulty. As such, this project appears to meet the exemption for the FPPA assessment. **Therefore, the FPPA assessment is not be required for this project.**

If the Federal agency assisting you with this project disagrees with my conclusion, let me know and I will contact our agency FPPA advisor and review the request again. If you have any additional questions, please contact me at (731) 668-0700.

A handwritten signature in cursive script, appearing to read "Charles L. Davis".

Charles L. Davis
Resource Soil Scientist

Natural Resources Conservation Service - Jackson Area Office
225 Oil Well Road, Jackson, Tennessee 38305
Voice (731) 668-0700 Fax (855) 564-6848
An Equal Opportunity Provider and Employer



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

December 10, 2015

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), WILDBERRY SOLAR ADVANTAGE, PHASE I
ARCHITECTURAL SURVEY, FAYETTE COUNTY, TENNESSEE (35° 3' 41" N, 89° 21' 55" W)

TVA proposes to enter into a power purchase agreement (PPA) with Coronal Development Services (Coronal) through the Renewable Standard Offer (RSO) program for power to be generated by Coronal's proposed 20-megawatt (MW) Wildberry Advantage solar farm east of Moscow in Fayette County, Tennessee. TVA's RSO program offers pre-set prices (the "standard offer") and terms and conditions for power generated by selected renewable energy technologies. TVA has determined that the proposed PPA constitutes an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. In this letter, we are initiating consultation with your office regarding the proposed Wildberry Solar Advantage project.

The project site consists of approximately 342 acres of undeveloped land (pasture and woodland) situated between State Route 57 and a railroad. The photovoltaic array ("solar panels") would occupy about 135 acres and would be made up of single-axis tracking solar modules installed on a ground-mounted racking system, constructed of galvanized steel racks, and supported by galvanized steel piles driven up to ten feet into the ground. The solar panels would be arranged in parallel rows, and would have a total height of approximately 10 feet at maximum tilt. Construction of each system would include installing the photovoltaic array, installing underground wiring in trenches, building an access road, enclosing the site with security fencing, and installing an electrical line to connect the system's transformers to the local electrical power distribution network. TVA has determined that the area of potential effects (APE) for archaeological resources consists of the ca. 342-acre proposed project site. The APE for above-ground (historic architectural) resources consists of areas within a half mile radius surrounding the project site.

Arcadis U.S., Inc. (Arcadis), which is managing the development of the project for Coronal, contracted with Cultural Resource Analysts, Inc. (CRA) for a Phase I archaeological survey of the 342-acre tract. Enclosed are two bound copies of the draft archaeological survey report, titled, *Phase I Archaeological Survey for the Proposed 20MW Wildberry Solar Farm, Moscow, Fayette County, Tennessee*. Arcadis also contracted with CRA for a historic architectural survey of the architectural APE. Enclosed are two copies of that draft report titled, *Architectural History Survey for the Proposed 20MW Wildberry Solar Installation, Fayette County, Tennessee*, along with two CDs containing digital copies.

CRA's archaeological site files check revealed that no sites had been previously identified in the

Mr. E. Patrick McIntyre, Jr.
Page Two
December 10, 2015

APE, and no previous archaeological surveys have taken place in the APE. The survey identified three concentrations of historic artifacts. None of the concentrations had been recorded as an archaeological site. All three are spatially associated with non-extant buildings that are depicted on the 1947 edition of the USGS Moscow, TN topographic quadrangle, but absent from the 1965 edition of that map. Based on the lack of diagnostic artifacts pre-dating 1933, and on the recommendation of Tennessee Division of Archaeology staff, CRA recorded all three concentrations as non-site localities rather than as archaeological sites. CRA recommends that all three non-site localities are ineligible for inclusion in the National Register of Historic Places (NRHP).

CRA's architectural background research revealed that no previously inventoried architectural resources, and no NRHP-listed properties, are located in the APE. The background study also revealed that 13 structures that were present before 1965 (but never recorded as architectural properties) have been demolished since that date. The survey identified 11 extant properties (designated FY350 to FY360) in the APE that meet the minimum age requirement of 50 years for a historic property. Based on the results of the survey, CRA recommends that all 11 properties are ineligible for in the NRHP. CRA recommends that no additional surveys of above ground resources are needed in connection with the proposed undertaking.

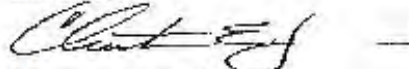
TVA has reviewed both reports and agrees with the authors' findings and recommendations. TVA finds that the APE contains no resources included in, or eligible for inclusion in, the NRHP.

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

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's finding of no historic properties affected.

If you have any questions or comments, please contact Richard Yarnell by telephone at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,



Clinton E. Jones, Manager
Biological and Cultural Compliance
Safety, River Management and Environment
WT11-CK

SCC:CSD

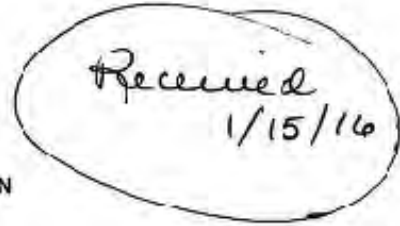
Enclosures

cc (Enclosures):

Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210



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



January 11, 2016

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

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, WILDBERRY SOLAR ADVANTAGE,
UNINCORPORATED, FAYETTE COUNTY, TN

Dear Mr. Jones:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 36 CFR 800 (Federal Register December 12, 2000, 77698-77739). Based on the information provided, we concur that the project area contains no archaeological resources eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

A handwritten signature in cursive script that reads "E. Patrick McIntyre, Jr.".

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

EPM/jnb

Nicholson, Charles P

From: Hamrick, Elizabeth Burton
Sent: Tuesday, May 10, 2016 9:38 AM
To: 'Mary Jennings (mary_e_jennings@fws.gov)'; Amy Turner (amy_turner@fws.gov)
Cc: 'Peggy Shute (peggy_shute@fws.gov)'; 'David Pelren (david_pelren@fws.gov)'; Baxter, John Tracy; Nicholson, Charles P
Subject: RE: TVA- Wildberry Solar Farm
Attachments: Wildberry_Indiana Bat_Phase_I_Survey_report 5.5.16.docx; Project Stream and Bat Habitat Photos Revised 4-14-16.pdf

Dear Mary:

In February our offices consulted on the Wildberry Solar Center in Fayette County. Amy provided us with a CMOU on February 12, 2016. Since that time, the project proponents have reconfigured the solar array to avoid most of the potential suitable summer roosting habitat for Indiana bat and northern long-eared bat. We respectfully request that the CMOU be modified to reflect the new acreage of potential habitat to be removed (0.44 acres) as described in the attached reports. If you have any questions, please don't hesitate to contact me.

Thank you very much!

Liz Hamrick

Terrestrial Zoologist
Biological Permitting and Compliance
Tennessee Valley Authority
400 W Summit Hill Dr, WT 11C-K
865-632-4011

From: Hamrick, Elizabeth Burton
Sent: Tuesday, February 09, 2016 1:12 PM
To: Mary Jennings (mary_e_jennings@fws.gov)
Cc: Peggy Shute (peggy_shute@fws.gov); David Pelren (david_pelren@fws.gov); Baxter, John Tracy; Dudley, Cynthia S; Robbie Sykes (robbie_sykes@fws.gov); Nicholson, Charles P
Subject: TVA- Wildberry Solar Farm

Dear Mary:

We respectfully request the review of our determinations regarding impacts to Indiana and northern long-eared bats for a proposed TVA Wildberry Solar Center in Fayette County, Tennessee. We are requesting that a conservation agreement (e.g. MOA or MOU) between TVA, Wildberry Solar Center, LLC, and USFWS be drafted and signed in association with this project in order to fulfill our ESA compliance obligations for Indiana bat. Please see the attachments in this email for complete informal consultation package.

Thank you!

Liz Hamrick
Terrestrial Zoologist
Biological Permitting and Compliance
Tennessee Valley Authority
400 W Summit Hill Dr, WT 11C-K
865-632-4011



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Tennessee ES Office

446 Neal Street

Cookeville, Tennessee 37001

Liz Hamrick
Terrestrial Zoologist
Biological Permitting and Compliance
Tennessee Valley Authority
460 W. Summit Hill Drive, West LLC-R
Knoxville, Tennessee 37902

Subject: FWS 2015-F-0342: Compensation for impact to bat habitat, Wildberry Solar Center, Fayette County, Tennessee.

Dear Ms. Hamrick:

We have analyzed the effects of the subject action under the 2015 Biological Opinion: Tennessee Field Office's Participation in Conservation Memoranda of Understanding for the Indiana Bat and/or Northern Long-eared Bat (BO). This action has been reviewed in accordance with an interim compliance process for projects being coordinated under the U.S. Fish and Wildlife Service's (Service) previous program for forest-dwelling bat Conservation Memoranda of Agreement. A standard, long-term process is being established by the Service to improve this program, and the interim procedure will be used until that process is formalized.

The Tennessee Valley Authority proposes to execute a power purchase agreement with Wildberry Solar Center, LLC (WSC), an affiliate of Coronal Development Services, LLC, to purchase electricity generated by WSC's proposed 20-megawatt solar photovoltaic facility near Moscow, Tennessee. The proposed solar farm and associated improvements (e.g. access roads, fence, and laydown area) would occupy up to 135 acres of the 347-acre project site. Conservation measures to be implemented for this project in association with the Conservation Strategy for Forest-dwelling Bats in Tennessee and BO have been evaluated by the Service to assess the direct, indirect, and cumulative effects of the proposed project on the two species.

The removal of suitable Indiana bat and northern long-eared bat habitat would occur during a timeframe when the species could be present but only during the non-maternity period. This will provide for avoidance of direct impacts to bats that are not yet flying and to adult female bats that are preparing to raise newborn pups. The period during which trees would be removed for this project is August 1 through March 31. The project proponent has chosen to contribute to the Tennessee Impaired Bat Conservation Fund (Tennessee IBCF) for this project. The contribution rate at the time of the request to enter into the Tennessee IBCF was \$3,650 per acre for this

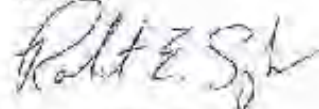
project and 0.4 "acre" of habitat would be removed ($0.4 \times 3,650.00 = 1,506.00$). We have received notification that the project proponent submitted a check in the amount of \$1,606.00 and it has been accepted by the Kentucky Natural Lands Trust for deposit into the account of the Tennessee IBCF for this project.

We conclude that impacts to Indiana bat and northern long-eared bat habitat would be adequately covered by the conservation measures agreed upon above. Any incidental take of Indiana and/or northern long-eared bats that will or could result from the forest habitat removal associated with this project would be authorized under the 40 and the northern long-eared bat 4(d) rule. Therefore, we have determined that the Wildberry Solar Center project is not likely to jeopardize the continued existence of the Indiana bat or northern long-eared bat or result in the destruction or adverse modification of designated critical habitat for either species.

This letter serves as documentation that the requirements of section 7 of the Endangered Species Act of 1973 (the Act), as amended, are fulfilled; and it applies to any associated federal agency action(s) that require coordination with the Service, such as federal permits or federal funding. We believe that the project plans adequately address potential direct, indirect, and cumulative effects upon the Indiana bat, northern long-eared bat, and other threatened and endangered species. Therefore, it is appropriate to conduct the tree-clearing activity between August 1st and March 31st. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for working with us to address concerns about impacts to the Indiana bat, northern long-eared bat, and the associated habitats. Feel free to contact Amy Turner, Ph.D. or my staff with any questions at 631/925-4987 or by email at amy.turner@fws.gov.

Sincerely,



for Mary E. Jennings
Field Supervisor

Appendix B – Comments on Draft Environmental Assessment



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

ROBERT J. MARTINEAU, JR.
COMMISSIONER

BILL HASLAM
GOVERNOR

March 7, 2016

Via Electronic Mail to cpnicholson@tva.gov

Charles P. Nicholson
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, TN 37902

Dear Charles P. Nicholson:

The Tennessee Department of Environment and Conservation (TDEC) appreciates the opportunity to provide comments on the Tennessee Valley Authority (TVA) *Draft Environmental Assessment for the Wildberry Solar Center Project* (Draft EA). The applicant, TVA, proposes to execute a power purchase agreement (PPA) with Wildberry Solar Center, LLC (WSC), an affiliate of Coronal Development Services LLC, for electricity generated by WSC's proposed 20-megawatt (MW) solar photovoltaic (PV) facility near the City of Moscow, Tennessee. The proposed solar farm would occupy up to 135 acres of a 347-acre site that WSC would lease for a 20-year period with 5-year extension options from the single private property owner. The proposed solar PV facility would be connected to the Chickasaw Electric Cooperative (CEC) distribution grid at an interconnection point located on the solar facility site. The existing 2.2-mile long CEC distribution line that runs west along Tennessee Highway 57 (TN 57) from the site to CEC's Moscow Substation would be upgraded to accommodate the electricity that would be generated by the proposed facility. TVA's 2015 Integrated Resource Plan (IRP) recommends the continued expansion of renewable energy generating capacity, including the addition of between 175 and 800 MW of solar capacity by 2023. The proposed action would help meet this need for additional solar capacity.

Actions considered in detail within the Draft EA include:

- **Alternative A – No Action Alternative** – Under the No Action Alternative, TVA would not purchase the power generated by the project under the Renewable Standard Offer (RSO) PPA with WSC. In the absence of the PPA, WSC would not construct and operate the proposed solar facility, and CEC would not make the upgrades to its electrical system necessary to transmit the power generated by the facility. TVA would continue to rely on other sources of generation described in the 2015 IRP to ensure an adequate energy supply and to meet its goals for increased renewable and low-greenhouse gas emitting generation. Environmental conditions in the Project Area would remain unchanged in the immediate future.
- **Alternative B – Proposed Action Alternative** – TVA would enter into a PPA with WSC through the RSO program to purchase the electricity generated from the proposed solar energy system for a 20-year period. WSC would construct, operate, and maintain a 20-MW direct current (DC) PV solar power generation facility on approximately 347 acres of privately owned land located near the City of Moscow in southern Fayette County, Tennessee. The proposed solar array and associated improvements (e.g., access roads, fence) would occupy approximately 135 acres of the project site, as either a single-axis tracking system, or a fixed-tilt array system. In addition, a laydown area (approximately 5 acres) within the fenced area

would be required and would be located in an area with no known environmental constraints (e.g., wetlands, streams).

TDEC's Tennessee Geological Survey (TGS), Division of Archeology (DoA), and Tennessee State Parks and Real Property Management have reviewed the Draft EA and have no specific comments regarding the proposed action or its alternative.

TDEC's Division of Air Pollution Control (APC) has reviewed the Draft EA and has the following comments on the proposed action and its alternative:

- If any open burning activity of tree or limb debris is being considered as part of land clearing operations, APC recommends that TVA include in the Final EA that such activities will be conducted in a manner to encourage good smoke dispersion and in accordance with the state open burning regulatory requirements.¹ However, because of the proximity to a local school, APC does not recommend that open burning be conducted on site as a means to dispose of the tree and other vegetation as part of land clearing operations.
- APC comments that the Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) citation in Table 3-1 "National Ambient Air Quality Standards" references an out of date source and recommends that TVA reference the current NAAQS EPA website in the Final EA.²
- APC comments that the proposed project does not directly include references to the demolition of any on-site buildings.³ However, if any structures are demolished, an asbestos demolition notification must be provided in advance and proper pre demolition surveys to identify any regulated asbestos containing materials (ACM) present would be required.
- APC commends TVA for pursuing additions to their power generation network that are non-polluting and produce little to no impact to the air environment.

TDEC's Division of Natural Areas (DNA) has reviewed the Draft EA and has the following comments on the proposed action and its alternative:

- DNA comments that the project area has been previously impacted by agriculture use and the habitat for state and federally listed plants appears scarce in the project vicinity. Therefore, DNA does not anticipate adverse impacts to rare, threatened or endangered plant species.
- To ensure that legal requirements for protection of the state listed rare animals are addressed, DNA recommends TVA coordinate with the Tennessee Wildlife Resources Agency⁴ and with U.S. Fish and Wildlife Service Field Office, Cookeville, Tennessee⁵ in regard to potential impacts to federally listed species and tree removal in the context of the Proposed Action Alternative.
- For stabilization of disturbed areas, DNA advocates the use of native trees, shrubs, and warm season grasses, where practicable. DNA recommends that care should be taken to prevent re-vegetation of disturbed areas with plants listed by the Tennessee Exotic Pest Plant Council as harmful exotic plants.⁶

TDEC's Division of Water Resources (DWR) has reviewed the Draft EA and has the following comments on the proposed action and its alternative:

- In Section 3.12.2.2, "Alternative B– Proposed Action Alternative," TVA discusses minimizing the disturbance of stream beds during the installation of buried electrical conduits by using horizontal

¹ TDEC APC Rule 1200-3-4-.01 *et al.*, <http://share.tn.gov/sos/rules/1200/1200-03/1200-03-04.pdf>. Additional information on open burning in Tennessee is available at <https://tn.gov/environment/article/apc-open-burning> and <http://www.burnsafetn.org/>.

² The current EPA NAAQS website is <http://www3.epa.gov/tm/naaqs/criteria.html>.

³ In section 3.4.1 "Affected Environment," TVA states "[t]here are buildings currently located on the property, including a former farm equipment storage shed with an attached smaller shed on each side; a sawmill building with two attached smaller sheds; and an adjacent carport."

⁴ Recommended Tennessee Wildlife Resources Agency contact is Rob Todd, rob.todd@tn.gov, 615-781-6577.

⁵ U.S. Fish and Wildlife Service Field Office, Cookeville, Tennessee phone number is 931-525-4970.

⁶ Additional information can be found at <http://www.tneppc.org/>.

direction drilling from adjacent upland areas. Based on information provided in the Draft EA, DWR comments that use of the horizontal directional drilling method would likely require a “no – notice” general permit for utility line crossings since there would be no direct impact to the bed or bank of a stream.

- In Section 3.13.2.2, “Alternative B– Proposed Action Alternative,” TVA discusses the potential impacts to wetlands. DWR comments that permanent impacts to wetlands, including conversion from forested to scrub-shrub, would require a proposed mitigation offset either on site or through use of local mitigation banks. DWR recommends that the site be designed in a manner that avoids fragmenting wetlands on or off site.⁷ Also, DWR comments that the impacts to wetlands would exceed the maximum allowable to be considered de minimus and recommend that TVA mention the preparation of an application for an Individual Aquatic Resource Alteration Permit (ARAP) in the context of the Proposed Action Alternative in the Final EA. Further, DWR recommends that storm water outfalls, if possible, be directed such that they provide input into on site wetlands and retention to provide additional stormwater filtration benefits prior to flowing into the Wolf River.

TDEC’s Division of Solid Waste Management (DSWM) has reviewed the Draft EA and has the following comments on the proposed action and its alternative:

- Based on the information available in the TDEC’s WasteBin database and files, DSWM did not identify any solid or hazardous waste facilities that conflict with the proposed action in or around the impacted parcel.⁸
- Tennessee’s Solid Waste Management program dates back to 1972, so there could conceivably be disposal in this area that predates TDEC’s program. Any wastes which may be unearthed during the project would be subject to a hazardous waste determination, and must be managed appropriately. DSWM recommends that TVA consider the management of potential wastes unearthed in the context of the Proposed Action Alternative in the Final EA.

TDEC’s Office of Energy Programs (OEP) has reviewed the Draft EA and has the following comments on the proposed action and its alternative:

- Under 2.1.2 “Alternative B – Proposed Action,” OEP recommends TVA consider using electric-powered lawn equipment, which are as much as fifty percent (50%) quieter than traditional gas-operated models and reduce petroleum-fuel purchases and used oil waste.⁹
- OEP is supportive of another decentralized power supply in the state. In the event of an energy emergency, the site may provide an emergency source of electricity that could serve critical infrastructure and facilities (e.g., hospitals, shelters, food banks) in the region.
- OEP recommends TVA include what type of coolant(s) will be used for the proposed transformers in the context of the Proposed Action Alternative in the Final EA.
- OEP comments that the WSC is within the New Madrid Seismic Zone. During a major seismic event, this area is expected to experience increased soil amplification and liquefaction. OEP recommends that TVA consider the potential for this site to be impacted by a seismic event and address considerations pertaining to seismic activities in the context of the Proposed Action Alternative in the Final EA.

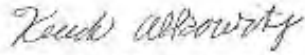
⁷ One method that can be used is to design road and fill zones such that they are moved to the outer fringe of wetlands rather than bisecting them where ever possible.

⁸ DSWM comments that review of data associated with hazardous waste generators in the general vicinity of Moscow, Tennessee identified Glasteel-Division of Stabilit America Inc. as a large quantity generator of hazardous wastes and Troxel Company as a small quantity generator of hazardous wastes. Troxel was noted on the RCRAInfo database as having a GPRAs 2020 list but is coded as having Human Exposures controlled, Groundwater controlled and Final Remedies in place. State Remediation is currently the lead agency for the Troxel site which is approximately 2-3 miles west of Moscow. DSWM notes that a Superfund National Priorities List (NPL) site, Chemet, was previously located immediately west of the Moscow-La Grange Elementary School.⁹ Upon completion of remediation activities (i.e. soil removal) at the Chemet site, confirmation sampling was performed and site was removed from the NPL.

⁹ Lawn equipment could be charged on site with the energy generated.

TDEC appreciates the opportunity to comment on this Draft EA. Please note that these comments are not indicative of approval or disapproval of the proposed action or its alternatives, nor should they be interpreted as an indication regarding future permitting decisions by TDEC. Please contact me should you have any questions regarding these comments.

Sincerely,



Dr. Kendra Abkowitz
Director of Policy and Planning
Phone: (615)-532-8689

cc: Mark Norton, TDEC, DoA
Ron Zurawski, TDEC, TGS
Lacey Hardin, TDEC, APC
Stephanie A. Williams, TDEC, DNA
James Sutherland, TDEC, DWR
Lisa Hughey, TDEC, DSWM
Molly Cripps, TDEC, OEP



2 Victory Avenue, Suite 500
Nashville, TN 37213
615-921-9470
Fax 615-921-8011
SouthernEnvironment.org

March 12, 2016

Charles P. Nicholson, PhD
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, TN 37902-1499

Via email to cpnicholson@tva.gov

Dear Chuck:

The Southern Environmental Law Center ("SELC") submits these comments on behalf of itself, the Sierra Club, and Community Sustainability USA, Inc., regarding the draft environmental assessment ("EA") for the Wildberry Solar Center Project proposed in Fayette County, Tennessee (the "Project").

SELC is a non-profit, regional environmental organization dedicated to the protection of natural resources throughout the Southeast. SELC works extensively on issues concerning energy resources and their impact on the people, culture, environment and economy in six Southeastern states—Tennessee, Virginia, North Carolina, South Carolina, Georgia and Alabama. SELC has participated in multiple stakeholder processes convened by TVA in its development of the 2015 Integrated Resource Plan ("2015 IRP"), including serving on its Regional Energy Resource Council, Integrated Resource Plan Working Group and Tennessee Valley Renewables Information Exchange.

The Sierra Club is America's largest and most influential grassroots environmental organization, with more than 2.4 million members and supporters. In addition to helping people from all backgrounds explore nature and our outdoor heritage, the Sierra Club works to promote clean energy, safeguard the health of our communities, protect wildlife, and preserve our remaining wild places through grassroots activism, public education, lobbying, and legal action.

Community Sustainability USA, Inc. ("CSUSA") is a non-profit organization dedicated to creating a culture that is committed to sustainability - an appreciation of our earth and a desire to protect it, ourselves, and future generations. In Tennessee, CSUSA works to empower people to take action to advance the transition away from fossil fuels to a 100% renewable energy economy.

We support development of the Project and TVA's purchase of the electricity generated from the Project as consistent with the 2015 IRP, which calls for increased investment in utility-scale solar power. We write to seek clarification regarding the Project's potential impacts on wetlands and on threatened or endangered species, and to highlight the Project's beneficial impact on climate change, the latter of which the EA does not thoroughly analyze.

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I. The EA discloses positive local socioeconomic impacts consistent with the goals of TVA's former solar programs.

The Project will facilitate the development of a 20 MW single-axis tracking solar PV system in Fayette County, Tennessee, pursuant to TVA's now-defunct Renewable Standard Offer ("RSO") program. We note that the Project will contribute beneficially to local economic development and the local tax base.¹ These economic development benefits are precisely the kind TVA's former RSO and Solar Solutions Initiative programs were designed to provide. We strongly encourage TVA to continue to consider these factors in its resource planning despite its recent decision to cut solar programs.

II. The EA's description of potential impacts to wetlands is unclear.

The Project Applicant appears to have designed the Project to avoid impacts to wetlands, consistent with best practices for the siting of solar facilities.² The EA states that the project will not require a Clean Water Act Section 404 permit.³ In its subsequent discussion of potential wetlands impacts, the EA describes eighteen wetlands that have been delineated within the project area.⁴ The EA states that "[p]ending review by the U.S. Army Corps of Engineers (USACE), these wetlands are considered potentially jurisdictional."⁵ The EA also notes that the Project Applicant consulted with a USACE representative who indicated that "USACE does not consider posts to count as an impact unless they are acting as a fill, and he agreed that the driving of fence posts should not be considered a fill."⁶ However, the EA does not provide further discussion of impacts to the "potentially jurisdictional" wetlands. As the EA notes, jurisdictional wetlands are protected by Section 404 of the Clean Water Act.⁷ The EA should provide greater clarity regarding the potential impacts to Clean Water Act jurisdictional wetlands to support its assertion that the project will not require a Section 404 permit.

III. The EA's description of potential impacts to threatened and endangered species is unclear.

The EA states that "[t]he project would require clearing of woodland that is potential habitat for bats listed as endangered and threatened under the Endangered Species Act" and that the Project Applicant has "entered into consultation with the U.S. Fish and Wildlife Service (FWS) on the effects of proposed action on listed species."⁸ The EA indicates that the Project would affect the Indiana and northern long-eared bats by clearing acres of forested summer roost.⁹

¹ EA at 23-24.

² EA at 53-55.

³ EA at 3.

⁴ EA at 53.

⁵ Id.

⁶ EA at 55.

⁷ 33 U.S.C. § 1344.

⁸ EA at 3.

⁹ EA at 60-61.

The Endangered Species Act requires that federal agencies authorizing, funding or carrying out any action that may affect protected species consult with the FWS.¹⁰ The EA indicates that Project Applicant has determined that the Project would affect two listed species of bats and that as a result, Project Applicant is engaging in Section 7 consultation with FWS.¹¹ The EA does not indicate the progress of the Section 7 consultation or whether Project Applicant has received indications from USFWS regarding the content of a Biological Opinion and its potential impacts on the Project. The EA should provide greater clarity regarding the status of U.S. Fish and Wildlife Service consultation and the potential alternatives that Project Applicant will consider depending upon the outcome of the consultation.

IV. The EA should discuss the Project's small but cumulatively beneficial impact on climate change.

NEPA requires TVA to consider the Project's impact on climate change.¹² TVA may consider the beneficial impact of the Project on climate change in addition to any negative impacts of the Project.¹³ As both the Supreme Court and the Council on Environmental Quality have recognized, because climate change is necessarily a global problem, it can only be addressed incrementally by reducing or eliminating emissions from many individual relatively small sources.¹⁴

Currently, fifty-seven percent of the Southeast region's electricity is generated by fossil resources.¹⁵ TVA is the primary generator and transmitter of electricity in Tennessee, and also serves portions of other states in our region, including Alabama, Virginia, North Carolina and Georgia.¹⁶ TVA's current generation portfolio reflects heavy investment in fossil resources (61% of TVA generation capacity) and little investment in wind and solar energy (<1% of TVA

¹⁰ 16 U.S.C. § 1536(a)-(d); 50 CFR 402.

¹¹ EA at 61.

¹² Council on Environmental Quality, Draft Guidance on Consideration of the Effects of Climate Change under NEPA 8-10 (December 2014) ("Draft Climate Change Guidance").

¹³ See, e.g., 42 U.S.C. §4332(C)(iv) (agency must consider relationship of short term use and long term productivity of environment); *Id.* §4331(b)(6) (agency required to "enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources"); 40 C.F.R. §1502.14(a) (agency must consider impacts of alternatives, including no-action alternative); Draft Climate Change Guidance at 19-20 ("[I]f a comparison of these alternatives based on GHG emissions, and any potential mitigation to reduce emissions, would be useful to advance a reasoned choice among alternatives and mitigations, then an agency should compare the levels of GHG emissions caused by each alternative—including the no action alternative—and mitigations to provide information to the public and enable the decisionmaker to make an informed choice.").

¹⁴ *Massachusetts v. EPA*, 549 U.S.497, 524 (2007); Draft Climate Change Guidance at 9 ("Government action occurs incrementally, program-by-program and step-by-step, and climate impacts are not attributable to any single action, but are exacerbated by a series of smaller decisions, including decisions made by government.").

¹⁵ Energy Information Agency, State Profile and Energy Estimates (January 2015), available at <http://www.eia.gov/state/compare/?sid=TN#?selected=US-AL-GA-NC-SC-TN-VA> (last visited September 11, 2015).

¹⁶ TVA, Our Customers, available at http://www.tva.com/power/power_customer.htm (last visited September 11, 2015).

generation capacity).¹⁷ For this reason, TVA has been identified as the nation's sixth largest carbon polluting electric utility.¹⁸

According to the 2015 IRP, TVA will cut carbon emissions significantly over the next twenty years.¹⁹ The Project would contribute to TVA's carbon reduction by generating carbon pollution-free electricity that displaces electricity generated by fossil fuels.²⁰ Therefore, the Project would have a small but cumulatively beneficial impact on climate change. In contrast, a decision to adopt the no-action alternative would do nothing to eliminate CO₂ emissions from TVA's generation portfolio.

Elevated levels of carbon dioxide (CO₂) and other greenhouse gases in the atmosphere endanger public health and welfare.²¹ The harms posed by CO₂-induced climate change are pervasive and severe.²² Based on the vast weight of scientific evidence, EPA has found that "climate change associated with elevated atmospheric concentrations of carbon dioxide and the other well-mixed greenhouse gases have the potential to affect essentially every aspect of human health, society and the natural environment."²³

The harmful effects of human-induced climate change cut across multiple sectors and geographic areas, affecting "human health, air quality, food production and agriculture, forestry, water resources, sea level rise and coastal areas, the energy sector, infrastructure and settlements, and ecosystems and wildlife."²⁴ The current and projected future consequences of climate change are dire. The Southeast is exceptionally vulnerable to sea level rise,

¹⁷ TVA, Final 2015 Integrated Resource Plan Supplemental Environmental Impact Statement 32 (June 2015) ("TVA IRP SEIS"), available at <http://www.tva.com/environment/reports/irp/pdf/TVA%20Final%20Integrated%20Resource%20Plan%20EIS%20Volume%201.pdf> (last visited September 11, 2015).

¹⁸ M.J. Bradley & Associates. (2015). *Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States* 10, available at <http://www.ceres.org/resources/reports/benchmarking-air-emissions-of-the-100-largest-electric-power-producers-in-the-united-states-2015/view> (based on 2013 generation).

¹⁹ Tennessee Valley Authority, Final 2015 Integrated Resource Plan 101, available at http://www.tva.com/environment/reports/irp/pdf/2015_irp.pdf (last visited September 11, 2015).

²⁰ EA at 27.

²¹ See U.S. Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009). Of the six greenhouse gases identified in EPA's Endangerment Finding, CO₂, along with methane, ranks as the most important directly emitted pollutant. *Id.* at 66,517.

²² See 74 Fed. Reg. at 66,523 (linking "human emissions and resulting elevated atmospheric concentrations of . . . greenhouse gases to observed global and regional temperature increases and other climate changes").

²³ 74 Fed. Reg. at 66,523.

²⁴ *Id.*

extreme heat events, hurricanes, and decreased water availability.²⁵

Rising global temperatures already are producing more frequent and more intense weather events, such as hurricanes and other storms, causing enormous damage to people, the environment, and the economy. As the figure below illustrates, the seven states in TVA's service territory have already experienced disproportionate damage from such events.²⁶



Figure Source: NOAA NCDC.

Category 4 and 5 hurricanes in the North Atlantic and the amount of rain falling in very heavy precipitation events have increased over recent decades and are projected to increase even further.²⁷ Heavy precipitation induces more floods, causing deaths, injuries, water-borne diseases, and mental health problems, such as post-traumatic stress disorders.²⁸ Higher

²⁵ Carter, L.M., et al., 2014: Ch. 17: Southeast and the Caribbean. *Climate Change Impacts in the United States: The Third National Climate Assessment*, Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yoke, Eds., U.S. Global Change Research Program, 396-417, available at <http://nca2014.globalchange.gov/report/regions/southeast> (last visited September 11, 2015).

²⁶ *Id.* at 397.

²⁷ *Id.* at 397.

²⁸ U.S. Environmental Protection Agency, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,393, 22,402 (Apr. 13, 2012).

average temperatures increase the likelihood of extreme heat waves, causing greater numbers of deaths and illnesses.²⁹ Since 1970, average annual temperatures in the Southeast have increased by about 2°F and are predicted to increase another 4 to 9°F by 2080.³⁰ These increased temperatures also will adversely affect air quality, raising ground-level ozone concentrations and associated premature deaths, acute cases of bronchitis, heart attacks, asthma attacks, and other respiratory illnesses.³¹

In addition, “[l]arge areas of the country are at serious risk of reduced water supplies, increased water pollution, and increased occurrence of extreme events such as floods and droughts.”³² In the Southeast, continued urban development and increases expansion of irrigated agriculture increase water demand while higher temperatures increase evaporative losses.³³ Rising temperatures are expected to escalate harmful blooms of algae and disease-causing agents in in-land and coastal waters, including the Gulf of Mexico.³⁴ Coastal areas face rising sea levels and more intense and damaging coastal storms and storm surges.³⁵ Large numbers of Southeastern cities, roads, railways, ports, airports, and water supplies are vulnerable to the impacts of sea level rise.³⁶ In short, “[o]ver the 21st century, climate change will fundamentally rearrange U.S. ecosystems.”³⁷ As with most environmental risks, these harms will disproportionately burden children, the elderly, and the poor.³⁸

Carbon dioxide emissions constitute the largest fraction of total greenhouse gas emissions in the U.S.³⁹ Fossil-fuel fired power plants are the largest sources of these CO₂ emissions.⁴⁰ Fossil fuel-fired power plants, like those heavily relied upon by TVA, “are by far the largest emitters of GHGs, primarily in the form of CO₂, among stationary sources in the U.S.”⁴¹ By displacing fossil-fuel generation in TVA’s service territory, the Project would thus

²⁹ *Id.*

³⁰ *Climate Change Impacts in the United States* at 398.

³¹ 77 Fed. Reg. 22,402.

³² *Id.*

³³ *Climate Change Impacts in the United States* at 405.

³⁴ *Id.* at 404.

³⁵ 77 Fed. Reg. 22,402.

³⁶ *Climate Change Impacts in the United States* at 400.

³⁷ 77 Fed. Reg. 22,402.

³⁸ 74 Fed. Reg. 66,526.

³⁹ 77 Fed. Reg. at 22,403.

⁴⁰ *Id.*

⁴¹ *Id.*

incrementally reduce the global CO₂ burden.

Swift and decisive action to slash CO₂ emissions is imperative to mitigate severe ecological, sociological, and economic impacts from climate change. We therefore encourage TVA to take into account the Project's potential to reduce carbon emissions when weighing its decision whether to move forward with the Project.

In sum, we welcome the Project as an investment in TVA's cleaner energy future. As the EA succinctly summarizes, "The operation of the solar energy system would result in a small increase in the capacity of non-emitting generating sources in TVA's energy resource portfolio and would generate power that otherwise would have been largely generated by the combustion of fossil fuels."⁴² We look forward to the contribution of the Project to TVA's portfolio.

Respectfully submitted,

/s

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/s with permission

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⁴² EA at 27.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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March 4, 2016

Charles P. Nicholson, PhD
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Subject: FWS# 16-F-0342, Wildberry Solar Center Project, Fayette County, Tennessee.

Dear Dr. Nicholson:

Thank you for your correspondence dated February 24, 2016, regarding the availability of the Environmental Assessment (EA) for the proposed Wildberry Solar Center Project, Fayette County, Tennessee. The EA included the results of a federally listed species survey conducted at the project site and requested our review and comments on the subject project. The following comments are provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. § 4321 et seq.); the Migratory Bird Treaty Act, as amended (16 U.S.C. 661-667e); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

The Tennessee Valley Authority (TVA) proposes to enter into a power purchase agreement (PPA) with Wildberry Solar Center, LLC (WSC), an affiliate of Coronal Development Services LLC, for electricity generated by WSC's proposed 20-megawatt (MW) solar photovoltaic (PV) facility near the City of Moscow, Tennessee. The proposed solar farm would occupy up to 135 acres of a 347-acre site that WSC would lease for a 20-year period with 5-year extension options.

Forest-dwelling Bat Species

According to the environmental document the proposed project would remove 32.75 acres of suitable roosting habitat for forest-dwelling bat species. The project applicant proposes to remove the 32.75 acres of potentially suitable summer roosting trees between October 15 and March 31, to avoid any direct effects to Indian bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*). On February 9, 2016, TVA indicated the desire of the applicant to enter into a conservation memorandum of understanding (CMOU) with the Tennessee Field Office (TFO) to address the proposed removal of habitat. The Service is currently waiting for

confirmation from the Kentucky Natural Lands Trust that the applicant has fulfilled their commitment to the CMOU process.

Fish and Wildlife Coordination Act

Based upon the presence of wetlands, streams and drainages in the project area, the project applicant should apply for a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers, prior to performing the work, if the project involves a discharge of dredged or fill material into waters of the United States, including any jurisdictional wetland, or, if mechanized land clearing or temporary stream rerouting or diversion will occur.

MBTA and BGEFA

Birds to be considered when assessing potential effects of solar facilities include all protected MBTA species (50 CFR 10.13) found within the area. These include individuals that are resident, breeding, overwintering, migrating, staging, roosting, feeding, resting, and otherwise transiting through potential project areas. Particularly close attention should be paid to avian species listed in the Birds of Conservation Concern (BCC), a set of lists generated by the Service identifying migratory birds of high conservation priorities at a variety of spatial scales. The most recent BCC lists were revised in 2008 (library.fws.gov/bird_publications/bcc2008.pdf; online version available at <http://www.fws.gov/migratorybirds/>).

Potential bald eagle nesting habitat includes large trees, often near river systems, reservoirs, lakes, bays and other fish-bearing bodies of water. Nests are usually located near the tops of the tallest trees and are added to and reused year after year. The project areas should be thoroughly surveyed to determine if this federally protected species or its nests may occur in the impact areas.

Best Management Practices (BMP) for Proposed Solar Facilities

The Service supports renewable energy development, but strongly encourages that it proceed in a manner that is also protective of fish, wildlife, and habitat required by both. We offer the following general recommendations to minimize potential impacts to fish and wildlife resources.

- Aquatic resources are highly susceptible to sedimentation. Therefore, we recommend that all practicable measures be taken to avoid adverse impacts to aquatic species, including implementing stringent sediment and erosion control measures and minimized use of herbicides. Erosion and sedimentation controls should be installed and maintained between the construction site and any nearby down-gradient surface waters. In addition, we recommend maintaining natural, vegetated buffers on all streams and creeks adjacent to the project site. For specific techniques and additional information regarding BMPs, see the following technical publication: "The Tennessee Erosion & Sediment Control Handbook" (August 2012), available from the Tennessee Department of Environment and Conservation or on-line at: http://tncpsc.org/TDFC_FandS_Handbook_2012_Edition4/TDFC%20FandS%20Handbook%204th%20Edition.pdf

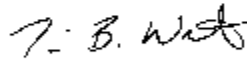
- Consider establishing vegetative cover on the site that is beneficial to wildlife such as native warm season grasses. Despite their short-term erosion-control benefits, many exotic species used in soil stabilization seed mixes are persistent once they are established, thereby preventing the reestablishment of native vegetation. Many of these exotics plants⁴ are also aggressive invaders of nearby natural areas, where they are capable of displacing already established native species. Based on the seed mix chosen for the vegetative cover, maintenance such as mowing may be needed. We suggest a maintenance schedule that occurs outside of nesting wildlife season, and avoids maintenance between April 1 and October 1. Pesticides, fertilizers, and other chemicals should not be used in wetland areas or near streams.

If pesticides or chemicals will be used for site maintenance, then stormwater runoff from the site should be directed to bio-retention areas prior to discharge to streams or wetlands to provide additional protection for water quality and aquatic and terrestrial wildlife habitats.

- When the overhead transmission lines are installed, the Service recommends implementing measures to minimize impacts to birds. These can include increasing line visibility, insulating wires to cover exposed connections, and increasing the distance between wires so no contact with ground or other energized wire can be made. For more information see <http://www.fws.gov/birds/documents/powerlines.pdf>.

Thank you for the opportunity to comment on this action. If you have any questions regarding the information which we have provided, please contact Amy Turner, Ph.D. of my staff at 931/525-4987, or by email at amy.turner@fws.gov.

Sincerely,



For Mary L. Jennings
Field Supervisor

⁴ Lists of invasive exotic plants can be found at <http://www.inppc.org/> and <http://www.invasive.org/exotic.html> on the Internet.