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DRAFT
ENVIRONMENTAL ASSESSMENT

WILDBERRY SOLAR CENTER PROJECT
Fayette County, Tennessee

Prepared for:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

Submitted by:
WILDBERRY SOLAR CENTER, LLC

Prepared by:
Arcadis

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To request further information, contact:
Charles P. Nicholson
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, Tennessee 37902-1499
Phone: 865-632-3582
E-mail: cpnicholson@tva.gov

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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
GHG	Greenhouse gas
IRP	Integrated Resource Plan
kV	Kilovolts
µg/m^3	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
NO_2	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
PM_{10}	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
POI	point of interconnection
PPA	power purchase agreement
ppm	parts per million
PV	photovoltaic
ROW	right-of-way
RSO	Renewable Standard Offer
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
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.

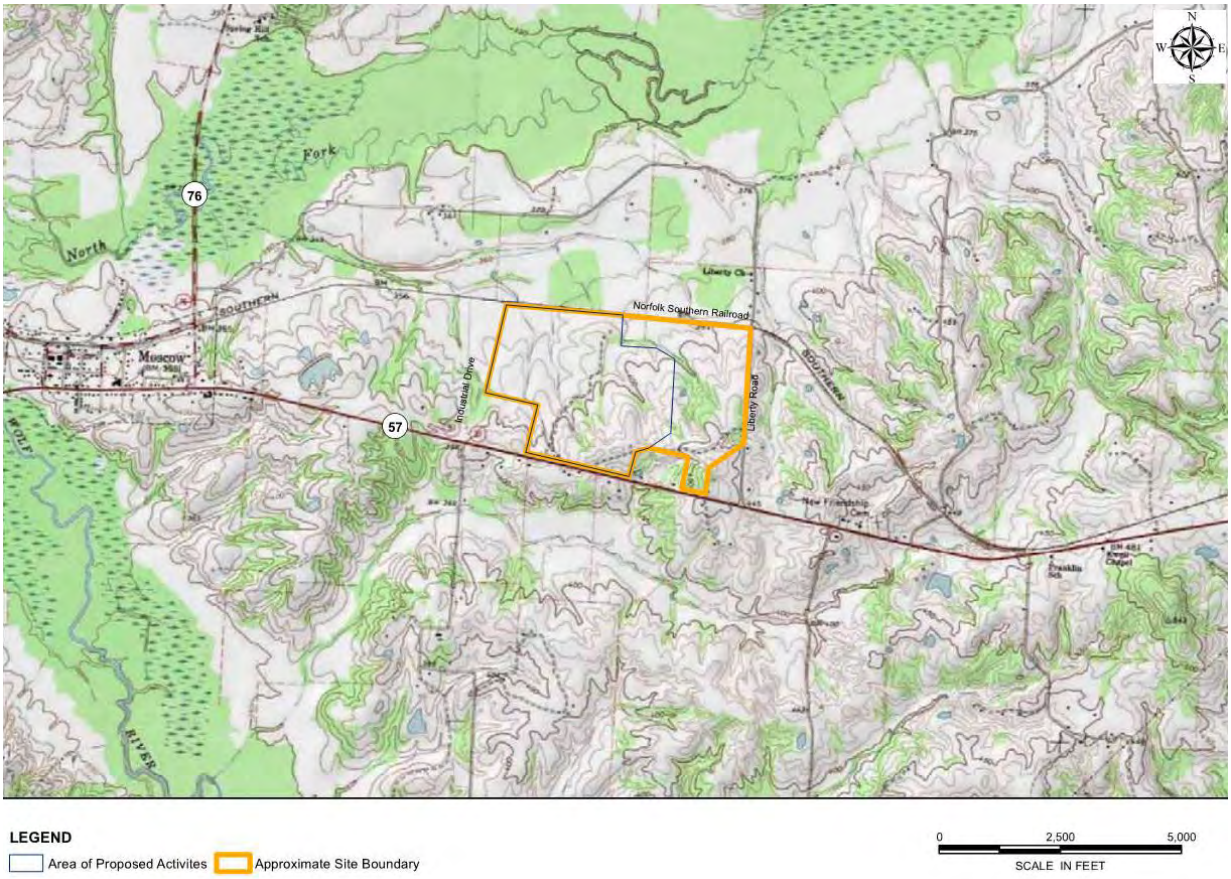

Figure 1-1. Location of the proposed Wildberry solar facility.

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 take into account applicable federal laws and regulations and 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 the facility would be consistent with the purposes, provisions, and requirements of 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
- Socioeconomics
- Environmental Justice
- Visual Resources
- Cultural Resources
- Air Quality and Greenhouse Gas Emissions
- Noise
- Utilities
- Waste Management
- Transportation
- Geology and Soils
- Surface Water
- Wetlands
- Vegetation
- Wildlife
- 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.

1.3 Necessary Permits or Licenses

As discussed in Section 2.1.2, the current conceptual 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. 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 entered into consultation with U. S. Fish and Wildlife Service (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 requirements in the National Electrical Code.

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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 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 (Option 1 as shown on Figures 2-1 and 2-2), or a fixed-tilt array system (Option 2 as shown on Figures 2-3 and 2-4). 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).

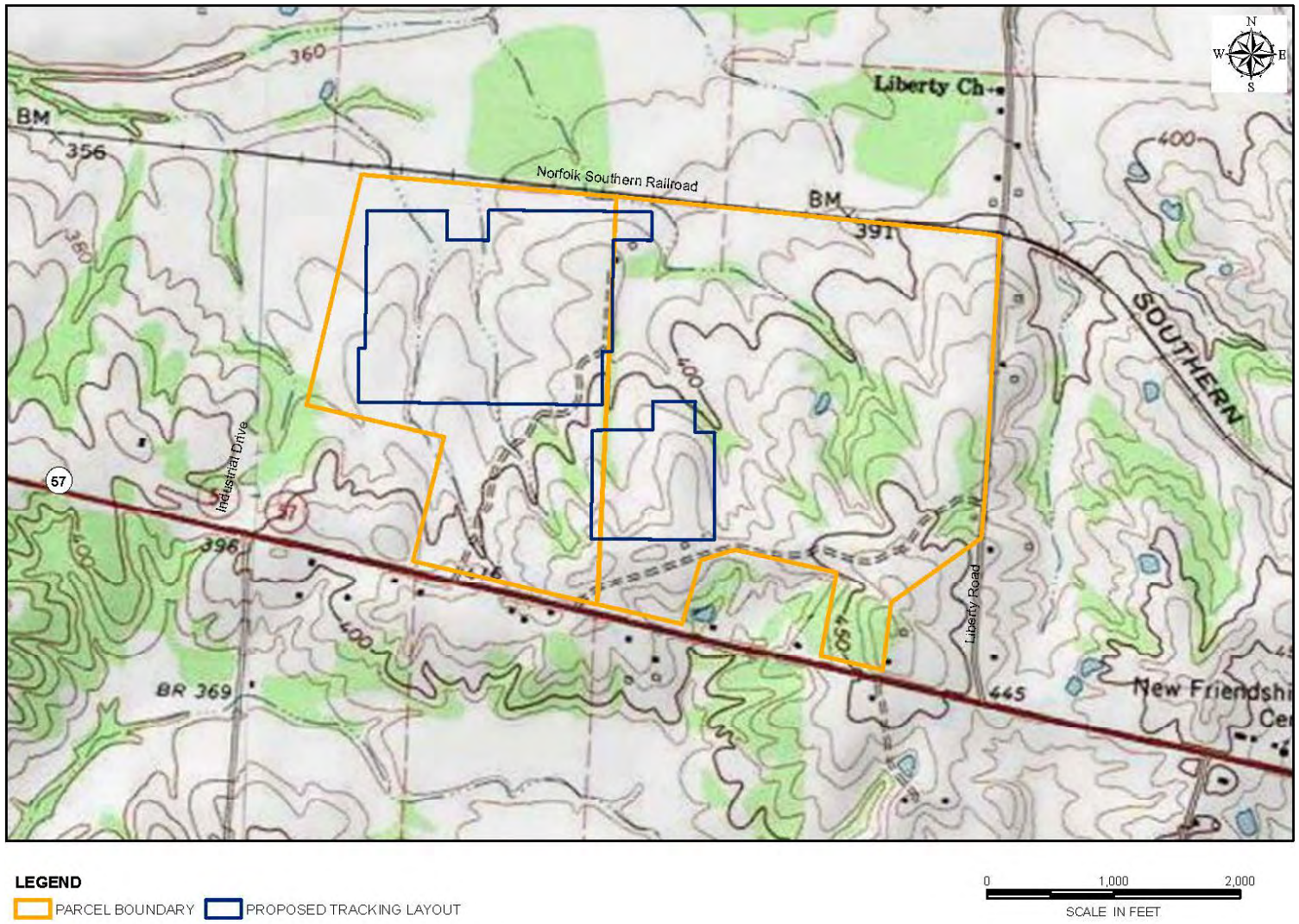

Figure 2-1. Wildberry solar development boundaries – Option 1, single-axis tracking system.

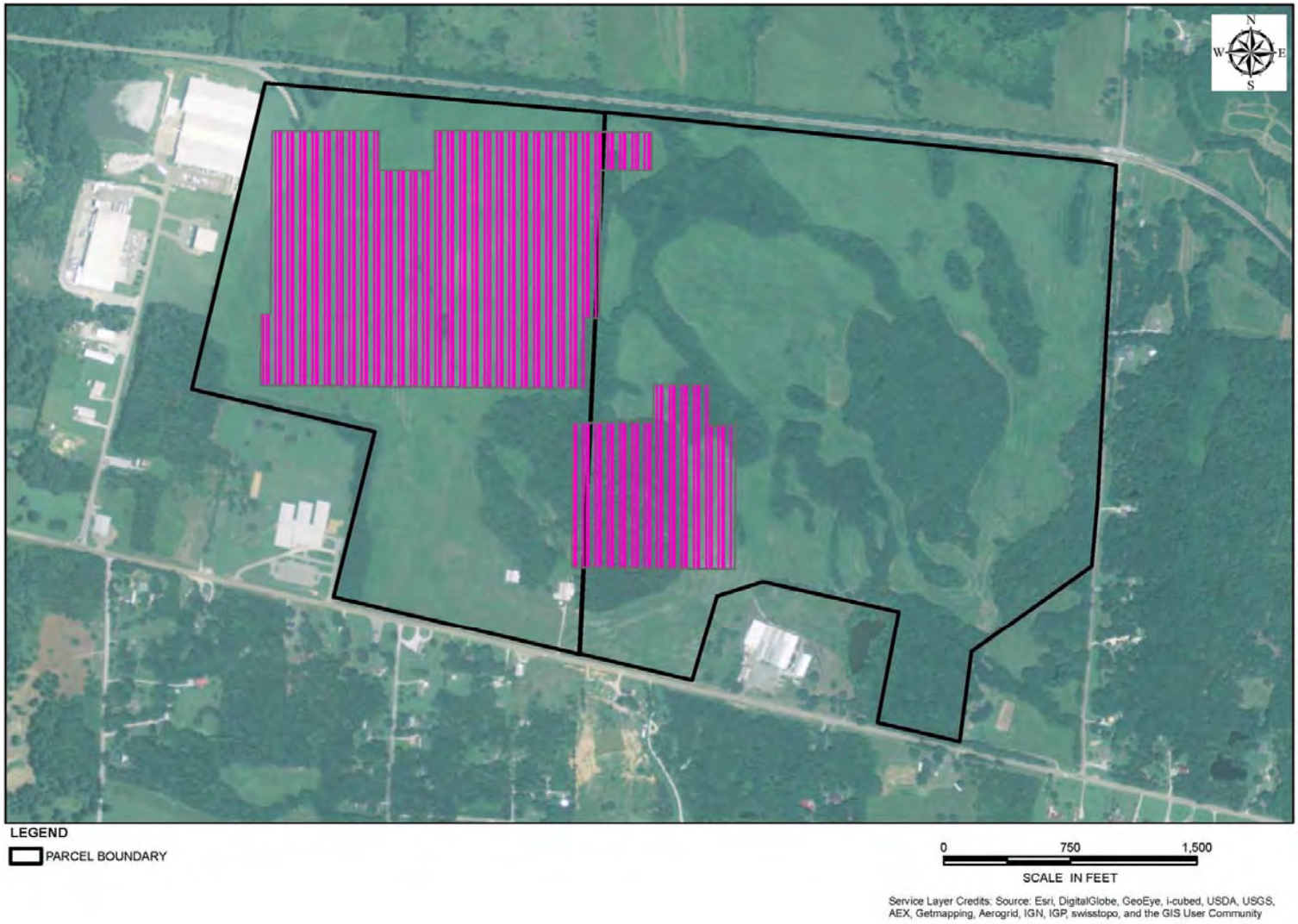

Figure 2-2. Wildberry solar conceptual site plan – Option 1, single-axis tracking system.

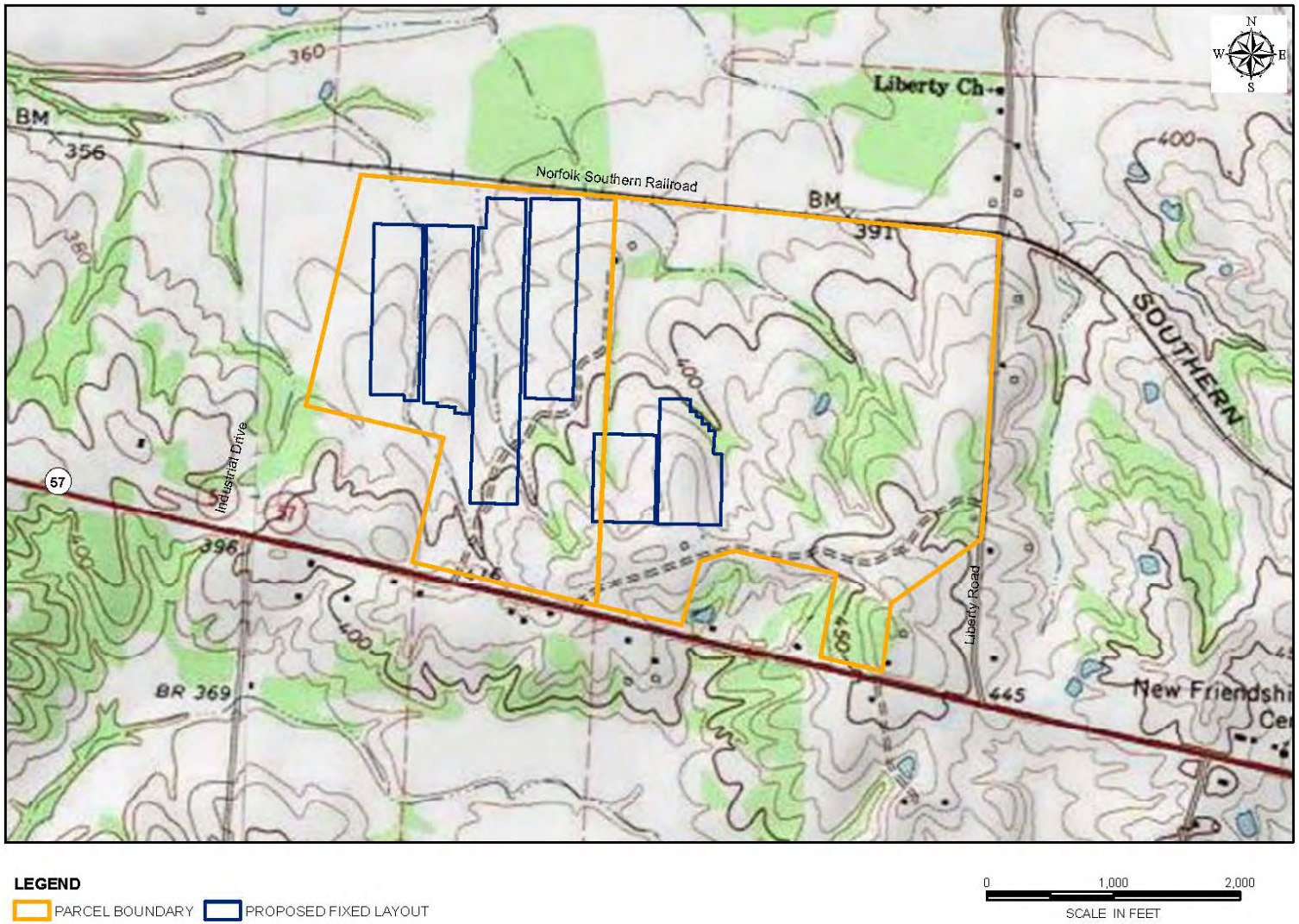

Figure 2-3. Wildberry solar development boundaries – Option 2, fixed-tilt system.

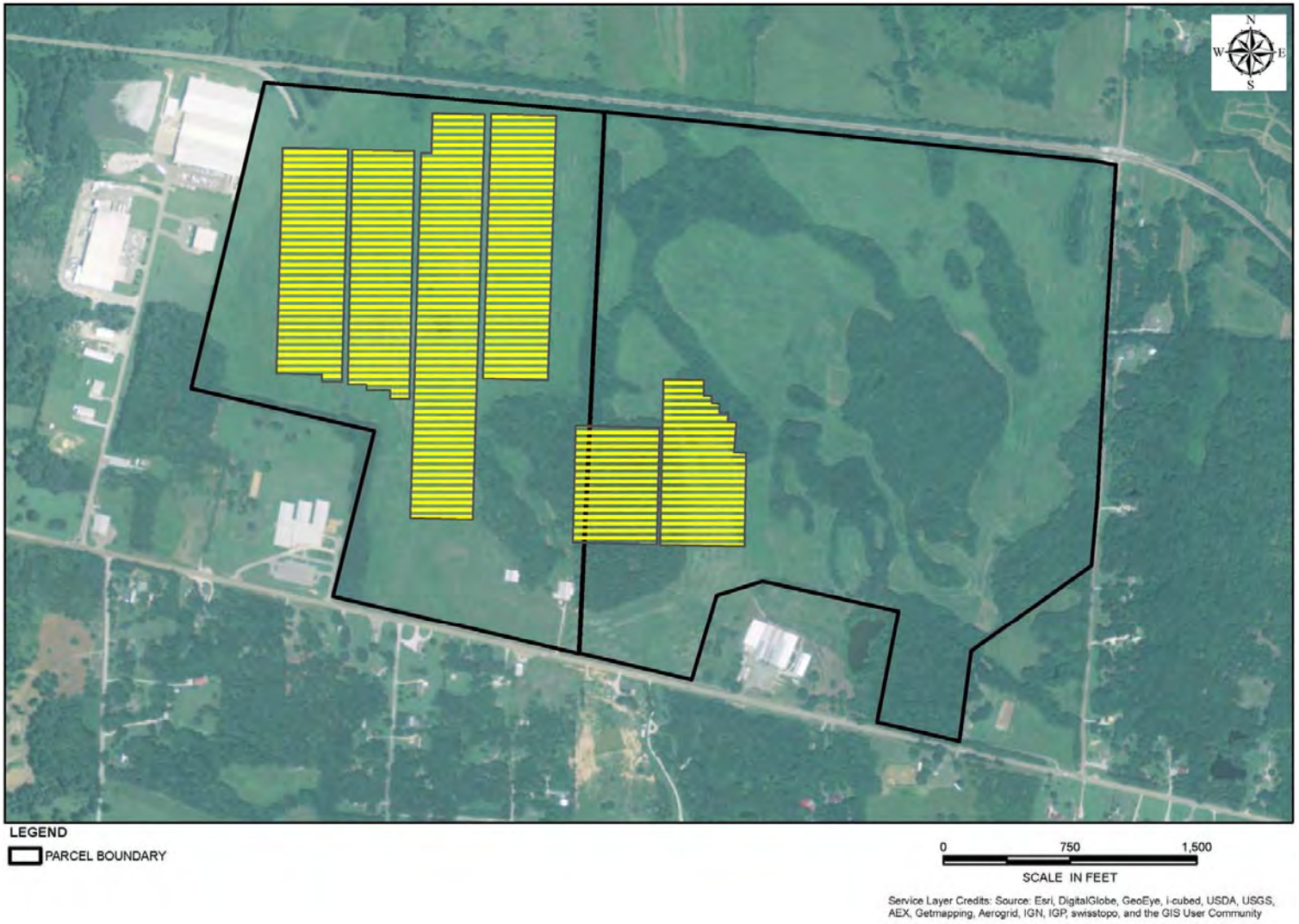

Figure 2-4. Wildberry solar conceptual site plan – Option 2, fixed-tilt system.

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. 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. 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 above grade surface for Option 1, depending on position of the sun and weather conditions, while Option 2 would reach a maximum height of 10 ft.

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 to10, 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 proposed solar facility consists of the clearing (removal of tall vegetation) of approximately 90 acres of agricultural fields, clearing and grubbing of approximately 43 acres of forest, clearing of 1.92 acres of forested wetlands, 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 POI with the CEC electrical distribution system. 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.

Standard practice is to work with the slope of the land and minimize grading work to the maximum extent possible. Any required grading would likely be limited to a maximum of approximately 133 acres within the fence line of the solar energy system (including laydown areas, roadways, nine 20-feet by 30-feet 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 naturally revegetated with 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. 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. 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.

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. The remaining 212 acres of the project site 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.

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

Unlike the 2014 conceptual design, the current solar energy system designs avoid a majority of the wetlands and streams that have been identified and field-delineated. Completely avoidance of wetlands is not practicable, as the resulting system designs would be less efficient due to shading from trees in wetlands and would not achieve the purpose and need for action. The current designs illustrated in Figures 2-1 through 2-4 are the most viable options for construction of the proposed 20 MW solar energy generating facility.

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.
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.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
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.
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	Minor direct, indirect, and cumulative adverse impacts anticipated. Approximately 1.95 acres of low to moderate quality wetlands would be affected by the installation of fencing or tree removal. Implementation of best management practices (BMPs) during construction minimizes impacts.
Vegetation	No impacts anticipated	Minor direct and no indirect or cumulative impacts associated with the clearing of up to about 45 acres of forest with 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 about 45 acres of forest.
Threatened and Endangered Species	No impacts anticipated	Direct, indirect, and cumulative impacts associated with the clearing of up to 45 acres of potential forested habitat for endangered and threatened bats. 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 Option1 (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.

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).

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

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, 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 remaining 212 acres of I-L (49.18 acres) and R-2 (162.82 acres) zoned land 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.

For the purpose of establishing a solar energy system, 184.18 of 347 acres of the project area was rezoned from R-2 to I-L classification. All zoning requirements will be met in association with the construction and operation activities of the Proposed Action Alternative. There are no special conditions in the Fayette County Legislative Body Resolution associated with the rezoning and the construction of either solar energy system option.

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.

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 (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.

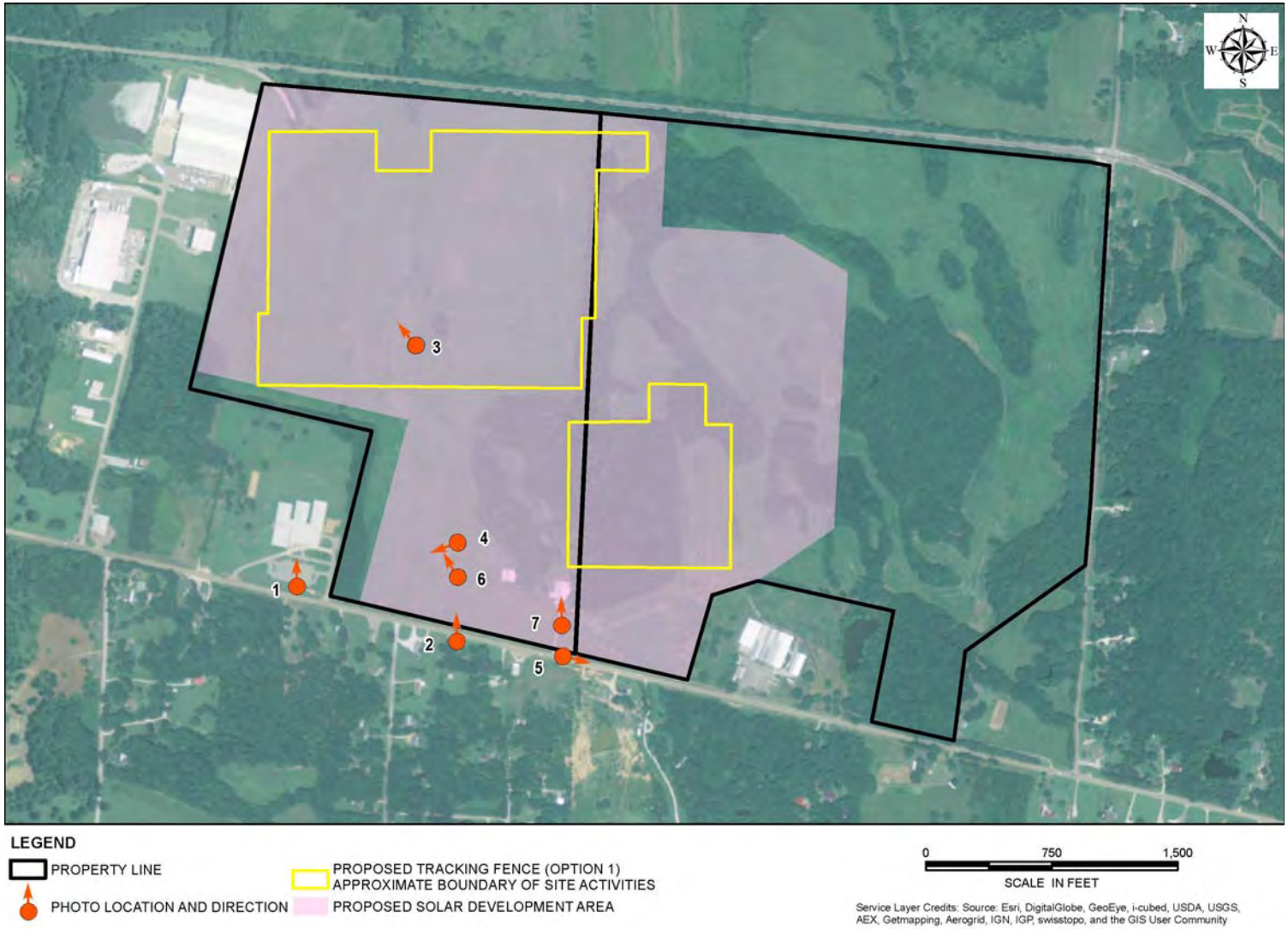

Figure 3-2. Locations of photographic documentation, with Option 1, single-axis tracking system site boundaries.

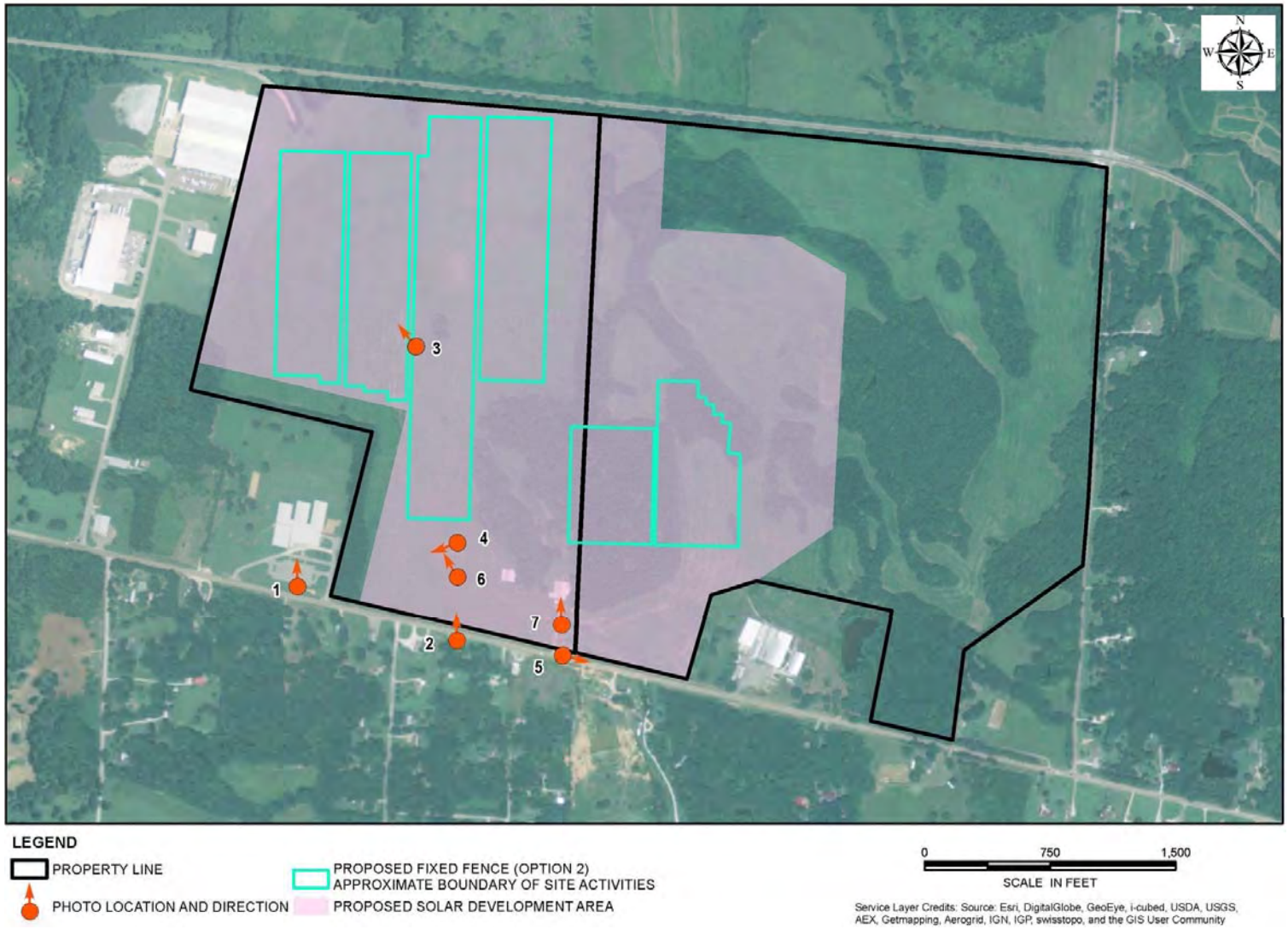

Figure 3-3. Locations of photographic documentation, with Option 2, fixed-tilt system site boundaries.

Photograph 1. View of school and tree line that runs between school and property buffer along with the existing interconnection line.

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 now agricultural 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 fenceline 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 12 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.

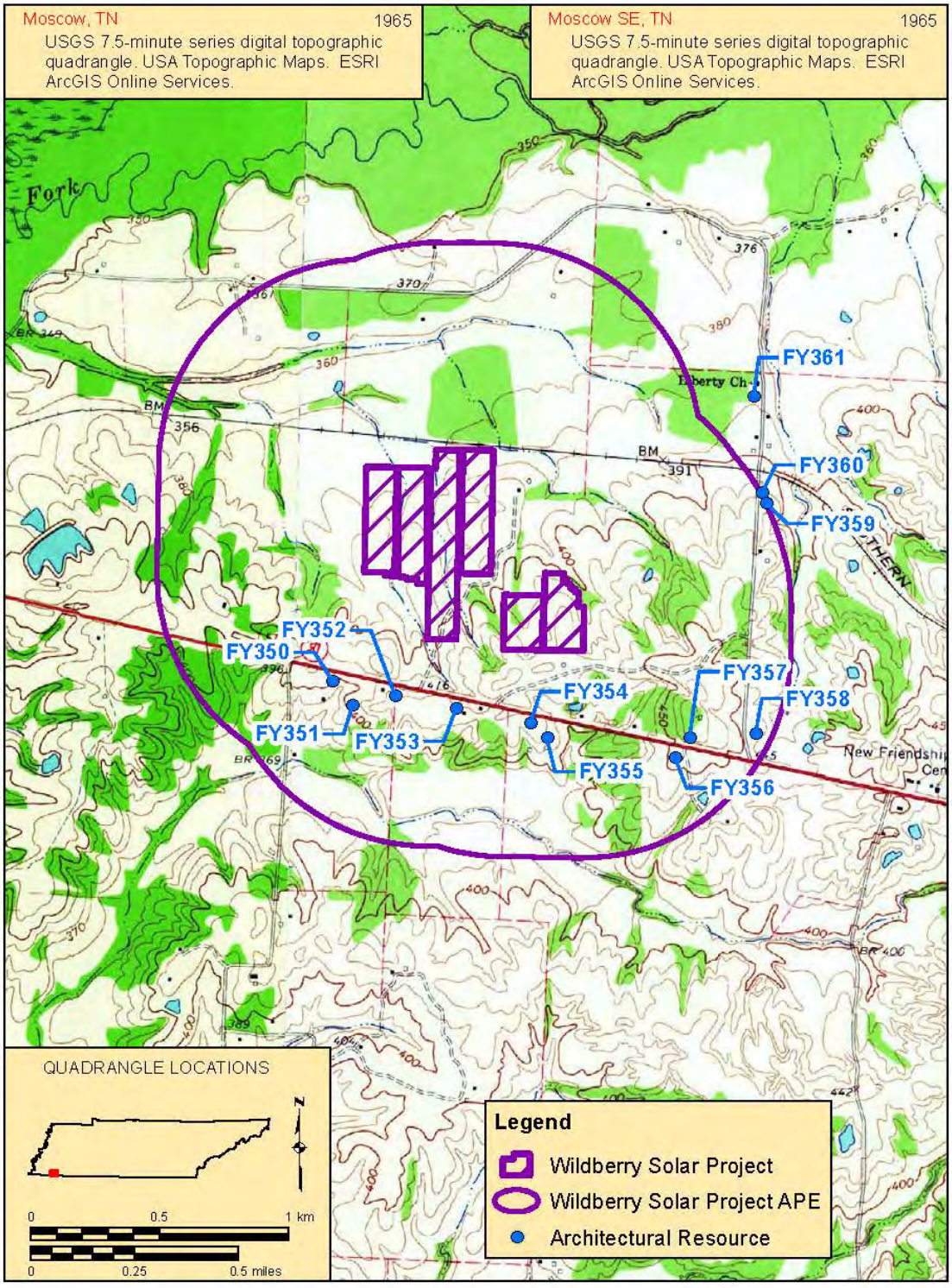

Figure 2. Topographic map depicting the project area, APE, and locations of the recorded architectural resources.

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.

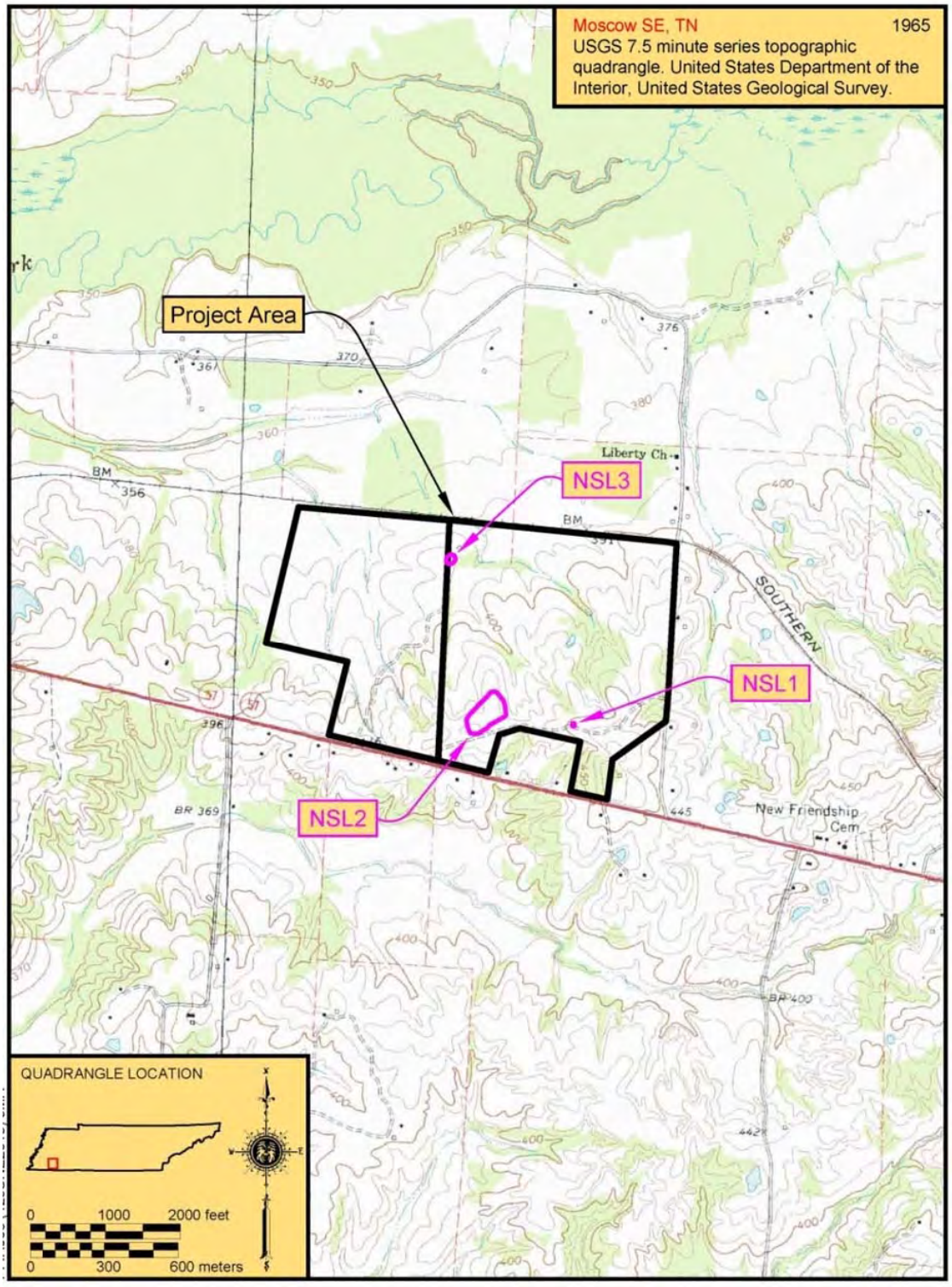

Figure 3-5 Archaeological survey results.

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 (SO_2)
- Ozone
- Nitrogen dioxide (NO_2)
- Particulate matter whose particles are less than or equal to 10 microns (PM_{10})
- 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, Madison 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	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead	Primary and secondary	Rolling 3 month average	0.15 µg/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 µg/m^3	Annual mean, averaged over 3 years
	Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
	Primary and secondary	24-hour	35 µg/m^3	98th Percentile, averaged over 3 years
PM_{10}	Primary and secondary	24-hour	150 µg/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 1hour 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 2012

Abbreviations: ppb = parts per billion, ppm = parts per million, µg/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 [µg/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 NO_2 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 SO_2 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

Negligible 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 SO_2 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. 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.

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.

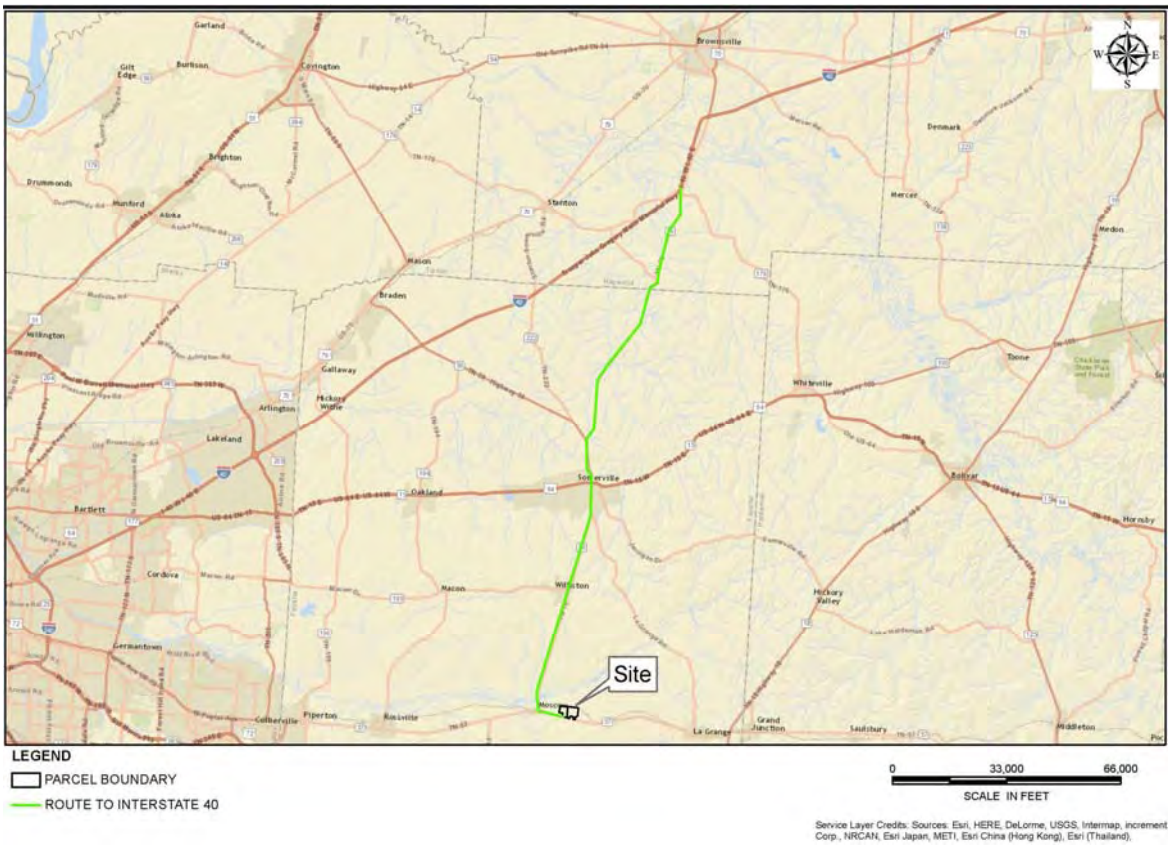

Figure 3-6 Primary traffic route for the project area.

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. Eight to 12 crew members would be on site from approximately 7 am to 5 pm, 5 days a week, for approximately 6 months. 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 25 to 30 additional vehicle trips per day on TN 57 and TN 76, which is an approximate 0.7 percent and 1.4 percent increase to the AADTs, respectively. Potential one-way peak hour would increase by approximately 10 percent for TN 57 and 20 percent for TN 76. Therefore, traffic would increase in the immediate area because of additional vehicles, which may cause 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. 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.

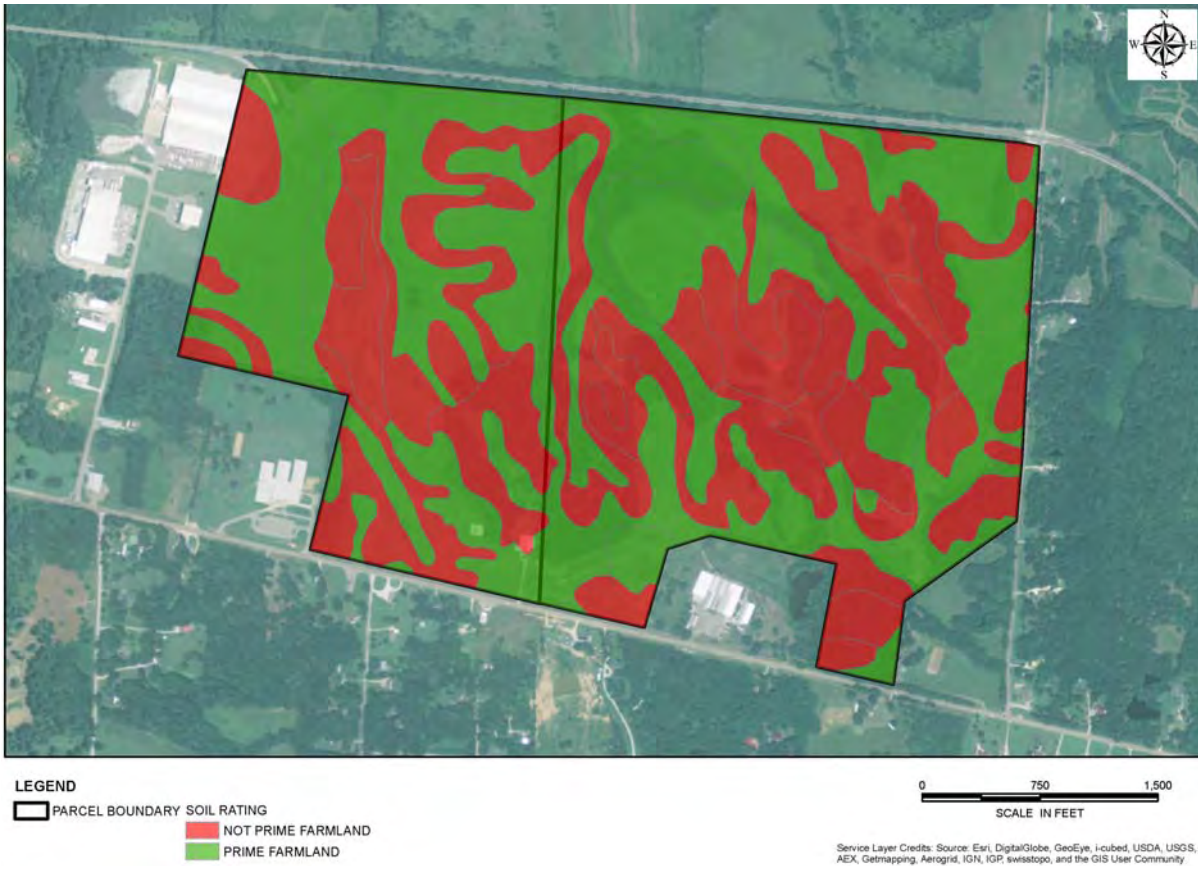

Figure 3-7. Prime farmland classification within the project area.

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. 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. Under both options, the conversion of the 135-acre area 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 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.

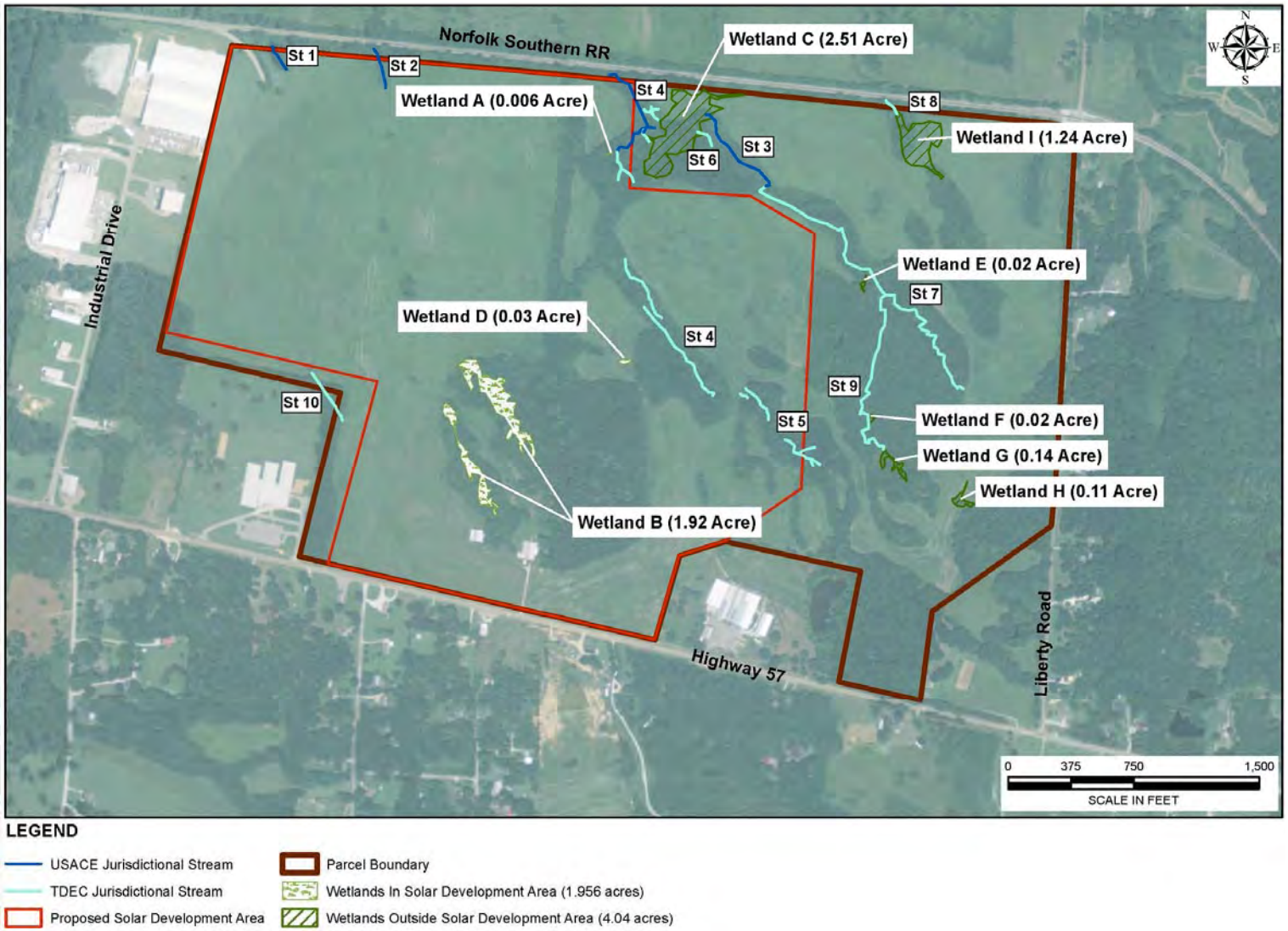

Figure 3-8. Streams (St 1 – St 10) and wetlands (A – I) in the project area.

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.

- 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.

- 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.

- 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 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 affecting Streams 1, 2 and 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 area. 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 solar panels on the racking systems and bottoms of the fencelines would be elevated to mitigate impediment of surface water flow within the stream beds. During the installation of buried electrical conduits, disturbance of the stream beds would be minimized by using horizontal direction drilling from adjacent upland areas.

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 contraction 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	Type[1]	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, would be affected by the construction and operation of the proposed solar facility. 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

Under both facility design options, 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).

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. Complete avoidance of impacts to wetlands is not practicable 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 facility design options, up to about 43 acres acres of upland forest and 1.92 acres of forested wetlands would be cleared to install the proposed solar energy system (see Figure 3-9). Following construction, the upland cleared areas would be revegetated with grass, the wetland areas would be allowed to naturally revegetate. The solar facility site would be maintained by routine mowing during the operation of the facility. This would result in the establishment of a mix of grasses and herbaceous vegetation within most of the facility site. 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. These habitats are common and well represented throughout the region. There would be long-term vegetation impacts associated with the change from agricultural and forested plant communities to permanent grass and herb cover. The herbaceous wetland habitats may transition over time to hosting more shade-tolerant species on the in the area of the PV arrays.

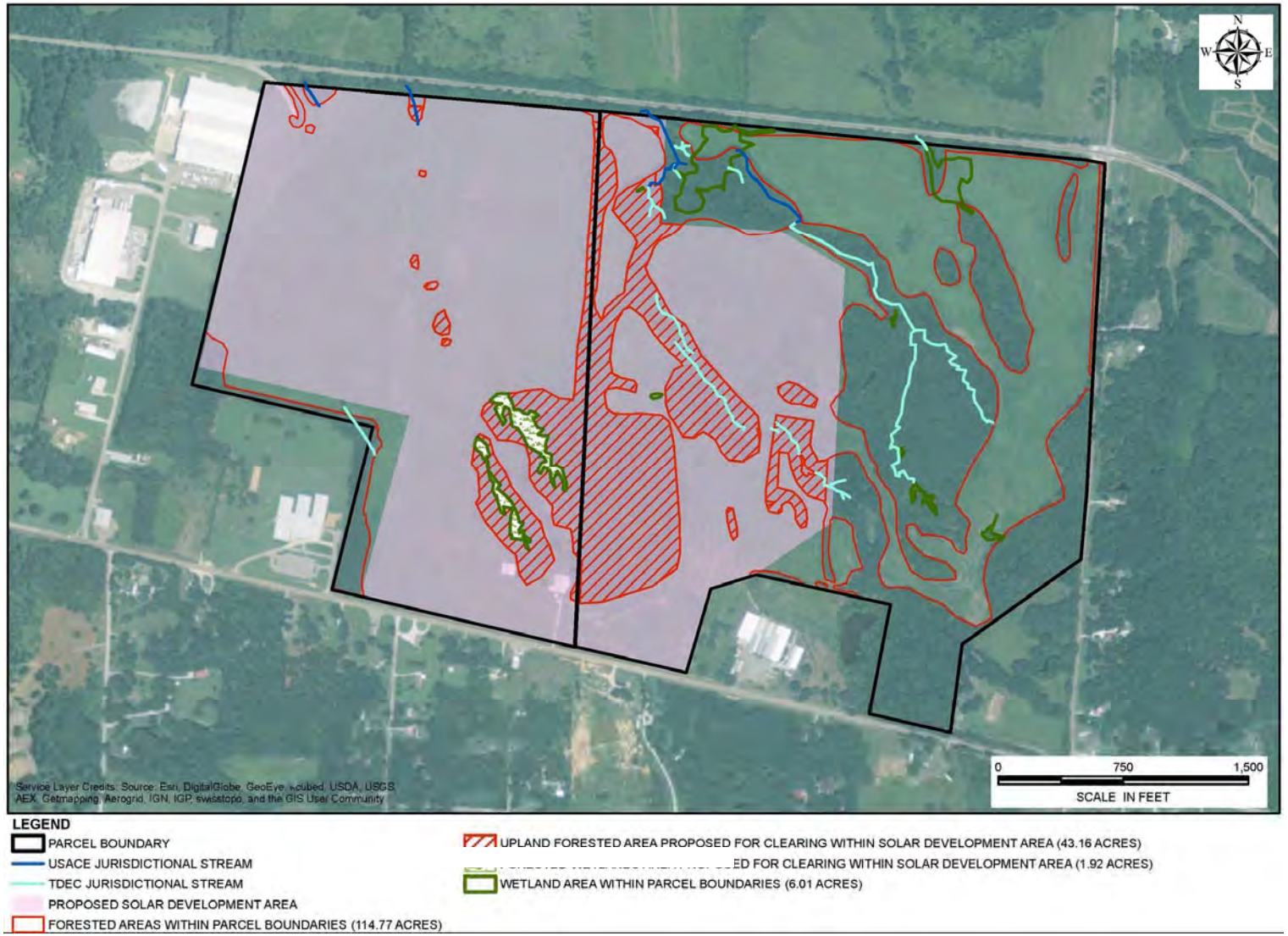

Figure 3-9 Forested areas within the project area

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. The construction of the solar facilities would affect about 90 acres of agricultural upland fields that would be graded, up to 43 acres of upland forested habitat that would be graded and grubbed, and 1.92 acres of forested wetlands that would be cleared (Figure 3-9). During construction, much of the wildlife would be eliminated or displaced from the 135-acre 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 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	*Lampsilis siliquoidea*		No status (S2)
Southern rainbow	*Villosa vibex*		No Status (S2)
Fish			
Piebald madtom	*Noturus gladiator*		NMGT (S3)
Mammals			
Indiana bat	*Myotis sodalis*	END	END (S1)
Northern long-eared bat	*Myotic septentionalis*	THR	NMGT (S4)
Southern bog lemming	*Synaptomys cooperi*		NMGT (S4)
Southeastern shrew	*Sorex longirostris*		NMGT (S4)
Meadow jumping mouse	*Zapus hudsonius*		NMGT (S4)
Plants			
Cluster fescue	*Festuca paradoxa*		S (S1)
Multiflowered mud-plantain	*Heteranthera multiflora*		S (S1)
Blue mud-plantain	*Heteranthera limosa*		THR (S1S2)

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

[2]State 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 project area, of which approximately 33 acres were identified as moderately suitable for summer roosting habitat for the two bats (Figure 3-9) as moderately suitable summer roosting habitat for the two bat species. 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.

3.16.1.1 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.

3.16.1.2 Alternative B – Proposed Action Alternative

The construction of the proposed solar facility would affect the Indiana and northern long-eared bats by clearing 32.68 acres of forested summer roost. This clearing would occur between October 15 and March 31 to avoid direct effects to the Indiana and northern long-

eared bats. TVA has determined that this clearing would result in minor indirect and cumulative effects to the two bats and is consulting with the USFWS under Section 7 of the Endangered Species Act on these effects. No other federally listed endangered or threatened species would be affected. 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. 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.

CHAPTER 4 – LIST OF PREPARERS

Brian Maillet (Arcadis)

Position:	Solar Program Manager
Education:	PMP, B.S., Environmental Science, Soil Engineering Minor
Experience:	19 years in NEPA Compliance, New and Traditional Energy Assessments, including generation, transmission, and legacy
Involvement:	Project Management

Charles P. Nicholson (TVA)

Position:	Senior NEPA Compliance Specialist
Education:	Ph.D., Ecology and Evolutionary Biology; M.S., Wildlife Management; B.S., Wildlife and Fisheries Science
Experience:	37 years in Zoology, Endangered Species Studies, and NEPA Compliance
Involvement:	NEPA Compliance

Hallie Hearnes (CRA)

Position:	Architectural Historian
Education:	M.A. Public History, Middle Tennessee State University; B.S. Historic Preservation, Southeast Missouri State University
Experience:	5 years in architectural history and regulatory compliance
Involvement:	Architectural Analysis and Reporting

Andrew Bradbury (CRA)

Position:	Principal Investigator, Archaeology
Education:	M.A. Anthropology/Archaeology, University of Tennessee; B.A. Anthropology/Archaeology, University of Tennessee;
Experience:	30 years in archaeology history and regulatory compliance
Involvement:	Archaeology Analysis and Reporting

Stephen C. Cole (TVA)

Education:	PhD, Anthropology; M.A., Anthropology; B.A., Anthropology
Experience:	14 years in cultural resource management, 4 years teaching anthropology at university
Involvement:	Cultural resources, NHPA Section 106 compliance

Elizabeth C. Burton Hamrick (TVA)

Education:	B.S., Wildlife and Fisheries Science, B.A. Biology and Anthropology
Experience:	13 years; 4 years endangered species studies, and NEPA Compliance
Involvement:	Threatened and Endangered Species

Sara M. Moore (Arcadis)

Position:	Senior Ecologist
Education:	M.S. Environmental Science and M. in Public Affairs; B.S. Environmental Science
Experience:	14 years in ecology and regulatory compliance

Involvement:	Biological resources, Section 404 Compliance, Biological Field Lead, Document Preparation

Tiffany Novak (Arcadis)

Position:	Senior Environmental Scientist
Education:	M.S. Geography and Climatology; B.S. Environmental Science
Experience:	10 years in regulatory and NEPA Compliance
Involvement:	Project Management, NEPA Compliance, Document Preparation

W. Richard Yarnell (TVA)

Education	B.S., Environmental Health
Experience:	40 years in cultural resource management
Involvement:	Cultural resources, NHPA Section 106 compliance

CHAPTER 5 – LITERATURE CITED

Aiken, S.G., Dallwitz, M.J., McJannet, C.L., and Consaul, L.L. 1996. Festuca of North America: Descriptions, illustrations, identification, and information retrieval.

Council on Environmental Quality. 1997. Environmental Justice – Guidance under the National Environmental policy Act. Available online at: http://www3.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf.

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Washington D.C.: U.S. Fish and Wildlife Publication FWS/OBS-79/31. Available online at http://www.fws.gov/wetlands/documents/classification-of-wetlands-and-deepwater-habitats-of-the-united-states.pdf. Accessed 15 June 2015.

Cultural Resource Analysts, Inc. (CRA). 2015a. *Records Review and Architectural Resource Assessment for the Proposed 20MW Wildberry Solar Farm, Fayette County, Tennessee*. Alan Higgins and Hallie Hearnes. Prepared for Arcadis, Inc.

_____. 2015b. *Phase 1 Archeological Survey of the Proposed 20MW Wildberry Solar Farm, Moscow, Fayette County, Tennessee*. Contract Publication Series 14-539. Thaddeus G. Bissett and Andrew P. Bradbury. Prepared for Arcadis, Inc.

Fayette County Planning and Development Office. 2013. Fayette County Zoning Ordinance, February 2013. Available at. http://www.fayettetn.us/Ordinances&Regulations/FCZoningOrd2013.pdf.

Jackson Chamber. 2014. April 2015 Labor Force Estimates. Available online at: http://jacksontn.com/economic/business_resources/workforce/unemployment. Accessed 20June 2015.

LeGrand, H.G. 2005. Associations of Avian and Herpetofauna Communities with Forest Management at Multiple Spatial Scales. Master's Thesis. Available online at: http://etd.lsu.edu/docs/available/etd-08192005-145124/. Accessed June 12 2015.

Mack, J. J. 2001. Ohio Rapid Assessment Method for Wetlands v. 5.0, User's Manual and Scoring Forms. Ohio EPA Technical Report WET/2001-1. Ohio Environmental Protection Agency, Division of Surface Water, 401/Wetlands Ecology Unit, Columbus, Ohio.

Miller, J.H., Manning, S.T., and S.F. Enloe. 2010. A management guide for invasive plants in the Southern forests. Gen. Tech. Rep. SRS-131. US Department of Agriculture, Forest Service, Southern research Station: 1-3.

Niemiller, M.L. R.G. Reynolds, and B.T. Miller (Eds.). 2013. The Reptiles of Tennessee. The University of Tennessee Press, Knoxville.

State of Tennessee. 2015. Labor Market Report. Department of Labor and Workforce Development. January. https://www.tn.gov/assets/entities/labor/attachments/LMRJan2015.pdf.

Tennessee Department of Environmental Conservation (TDEC). 2014. Year 2014, 303(d) List. Available online at: https://www.tn.gov/assets/entities/environment/attachments/2014-proposed-final-303d-list.pdf.

Tennessee Department of Transportation. 2015. Tennessee Traffic history [database]. Available online at: https://www.tdot.tn.gov/APPLICATIONS/traffichistory. Accessed June 20 2015.

Transportation Research Board. 2000. Highway Capacity Manual. Transportation Research Board, National Research Council, Washington, D.C.

Tennessee Valley Authority (TVA). 2011. Final Integrated Resource Plan, TVA's Environmental & Energy Future. Knoxville, Tennessee.

_____. 2015. Integrated Resource Plan 2015 Final Supplemental Environmental Impact Statement. Available online at http://www.tva.com/environment/reports/irp/pdf/TVA-Draft-irp-EIS.pdf. Accessed 12 June 2015.

U..S. Army Corp of Engineers (USACE). 2015. Telephone conversation regarding USACE not considering piles and posts installed in wetlands as fill. Tim Flinn of the USACE Memphis District and Ms. Sara Moore of Arcadis. October 30, 2015.

U.S. Census Bureau. 2015. State and County QuickFacts – Madison County, Tennessee. Available online at: http://quickfacts.census.gov/qfd/states/47/47113.html. Accessed 18 June 2015.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). n.d.[a]. 2014. Web Soil Survey. <http://websoilsurvey.nrcs.usda.gov.> Accessed 2 June 2015

_____. n.d. [b]. 2014. Farmland Protection Policy Act. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143_008275&navid=100170180000000&position=Welcome.Html&ttype=detail> Accessed 13 April 2015.

U.S. Department of Labor, Bureau of Labor Statistics. 2015. Databases, Tables & Calculators by Subject. Unemployment search for Madison County. Available online at: http://www.bls.gov/data/. Accessed 20 June 2015.

U.S. Department of Transportation (USDOT). 2015. Highway Traffic Noise - Construction Noise Handbook. Federal Highway Administration. Available online at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

U.S. Environmental Protection Agency (USEPA). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances December 31, 1971.

USEPA. 2015a. Tennessee Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. January 30, 2015. Available online at http://www.epa.gov/airquality/greenbook/anayo_tn.html. Accessed June 9, 2015.

USEPA. 2015b. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013. EPA 430-R-15-004. April 15, 2015. Available online at http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Main-Text.pdf. Accessed June 20, 2015.

USEPA. 2015c. Sources of Greenhouse Gas Emissions – Agriculture Section Emissions. Available online at http://epa.gov/climatechange/ghgemissions/sources/agriculture.html. Accessed June 20, 2015.

USEPA. 2012. National Ambient Air Quality Standards. Codified at 40 CFR Part 50. Available online at: http://www.epa.gov/air/criteria.html. Accessed 13 April 2015.

U.S. Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5, & 6. January 6, 2014. Available at http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf. Accessed 13 April 2015.

USFWS. 2013. IPaC – Information, Planning, and Conservation System. Last Updated: December 12, 2013. Available at http://ecos.fws.goc/ipac. Accessed 13 April 2015.

Whitaker, J.O. Jr., and W.J. Hamilton. 1998. Mammals of the Eastern United States. Third Edition. Cornell University, New York.

Appendix A – Correspondence

USDA

United States Department of Agriculture

Date: August 18, 2015

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

Re: Proposed Providence Solar Center in Madison County, Tennessee

Mr. Mailet,

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 projects 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.

Charles L. Davis
Resource Soil Scientist

Natural Resources Conservation Service - Jackson Area Office
235 Oil Well Road, Jackson, Tennessee 38305
Voice (731) 668-0700 Fax (855) 564-5848
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' 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

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

Received 1/15/16

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,

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

EPM/jmb