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SR McKELLAR SOLAR

DRAFT ENVIRONMENTAL ASSESSMENT

Madison County, Tennessee

Prepared for:
Tennessee Valley Authority
Knoxville, Tennessee

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
AC	alternating current
AOI	area of interest
APE	Area of Potential Effects
AR	anti-reflective
ARAP	Aquatic Resource Alteration Permit
BF	breaker failure
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CT	current transformer
CWA	Clean Water Act
dBA	A-weighted decibel
DC	direct current
DFR	digital fault recorder
EA	Environmental Assessment
EO	Executive Order
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FAR	Forestry-Agriculture-Recreation (zoning type)
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
GHG	greenhouse gas
IPaC	Information for Planning and Conservation
IRP	Integrated Resource Plan
JEA	Jackson Energy Authority
kV	kilovolt
kW	kilowatt
LF	linear foot
MW	megawatt
MVA	mega volt amp
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OHWM	ordinary high-water mark
OSHA	Occupational Safety and Health Administration
PCN	Pre-Construction Notification
PEM	Palustrine Emergent (wetland type)

PFO	Palustrine Forested (wetland type)
PGA	peak ground acceleration
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
PMU	phasor measurement unit
PPA	power purchase agreement
PSS	Palustrine Scrub-Shrub (wetland type)
PUB	Palustrine Unconsolidated Bottom (wetland type)
PV	photovoltaic
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SRC	Silicon Ranch Corporation
SR McKellar	SR McKellar, LLC
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TL	transmission line
TN	Tennessee
TN-QHP	Tennessee Qualified Hydrologic Professional
TT	transfer trip
TVA	Tennessee Valley Authority
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
USGS	U.S. Geological Survey
VT	voltage transformer
WWC	wet weather conveyance

CHAPTER 1

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has entered into a Power Purchase Agreement (PPA) with SR McKellar, LLC (SR McKellar), a wholly-owned subsidiary of Silicon Ranch Corporation (SRC), in Madison County, Tennessee. The long-term PPA would provide for TVA's purchase of electric power generated by the solar photovoltaic (PV) facility for 15 years.

In order to fulfill the PPA, SR McKellar plans to develop a solar PV facility across eight parcels of land, totaling approximately 942 acres, roughly 1.5 miles south of US 70/ State Route 1 (SR 1) (Airways Boulevard), west of Smith Lane and north and south of Denmark Jackson Road in Madison County, Tennessee (TN). The vast majority of the development is proposed along portions of Smith Lane and Denmark Jackson Road that are part of a rural two-lane section of SR 223. McKellar-Sipes Regional Airport, which has main access from SR 223, is approximately 0.6-mile northeast of the project site. While design of the facility is in the process of being finalized, the conceptual plan includes monofacial solar modules comprised of approximately 212,800 individual panels arranged over roughly 432 acres.

For the purpose of this Environmental Assessment (EA), the project site is defined as the 942-acre subject property. The proposed facility would occupy approximately 432 acres of the roughly 942-acre property to be owned by SRC and leased to SR McKellar for the project. The proposed facility would have a direct current (DC) generating capacity of approximately 95 megawatts (MW) and would interconnect to the Jackson Energy Authority (JEA) distribution network. The project would consist of multiple parallel rows of PV panels on single-axis tracking structures with driven pile foundations, connecting to the existing McKellar, TN 161-kilovolt (kV) Switching Station approximately 1,500 linear feet (LF) north of SR McKellar's northern boundary and adjacent to the proposed gentie. The panels would face 60 degrees east and track the sun throughout the day until they face 60 degrees west at sunset. The PV panel surface material would be a smooth glass with an anti-reflective (AR) coating.

Figure 1 identifies the location of the proposed solar facility.

1.1 PURPOSE AND NEED FOR ACTION

TVA is a corporate agency of the United States and the largest public power provider in the country. Through its partnership with 153 local power companies, TVA supplies energy across 80,000 square miles for 10 million people, 750,000 businesses, and 56 large industrial customers, including military installations and the U.S. Department of Energy facilities at Oak Ridge, Tennessee. TVA's service area includes parts of seven southeastern states called the Tennessee Valley. Since 1933, TVA's mission has been to serve the people of the region to make life better. TVA continues to execute on that mission today as it serves the Tennessee Valley through its commitment to leadership and innovation in energy, the environment and economic development. TVA has one of the largest, most diverse, and cleanest energy-generating systems in the nation characterized by low carbon, low rates, and high reliability – maintaining 99.999% reliability to customers since 2000.

TVA produces or obtains electricity from a diverse portfolio of energy sources, including solar, hydroelectric, wind, biomass, fossil fuel, and nuclear. The 2011 TVA Integrated Resource Plan (IRP) (IRP; TVA 2011) established the goal of increasing TVA's renewable energy generating capacity by 1,500 to 2,500 MW by 2020. The IRP identified the various resources that TVA intends to use to meet the energy needs of the TVA region over the 20-year planning period while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy and to reduce environmental impacts. TVA's 2015 IRP (TVA 2015a) reinforced the continued expansion of renewable energy generating capacity, including the addition of between 175 and 800 MW (AC) of solar capacity by 2023. In June 2019, TVA released the final 2019 IRP and the associated EIS (TVA 2019a). This updated IRP provides further direction on how TVA will deliver clean, reliable, and affordable energy in the Valley over the next 20 years, and the associated EIS describes the natural, cultural and socioeconomic impacts associated with the IRP. The 2019 IRP recommends solar expansion and anticipates growth in all scenarios analyzed, with most scenarios anticipating 5,000-8,000 MW and one anticipating up to 14,000 MW by 2038 (TVA 2019a).

In 2019, customer demand prompted TVA to release a Request for Proposal (RFP) for renewable energy resources (2019 Renewable RFP). The PPAs that resulted from this RFP (including the SR McKellar PPA) will help TVA meet immediate needs for additional renewable generating capacity in response to customer demands and fulfill the renewable energy goals established in the 2019 IRP. The Proposed Action would provide cost-effective renewable energy consistent with the IRP and TVA goals.

1.2 BACKGROUND

Under the PPA, SR McKellar would fund, build, own, and operate the solar energy facility.

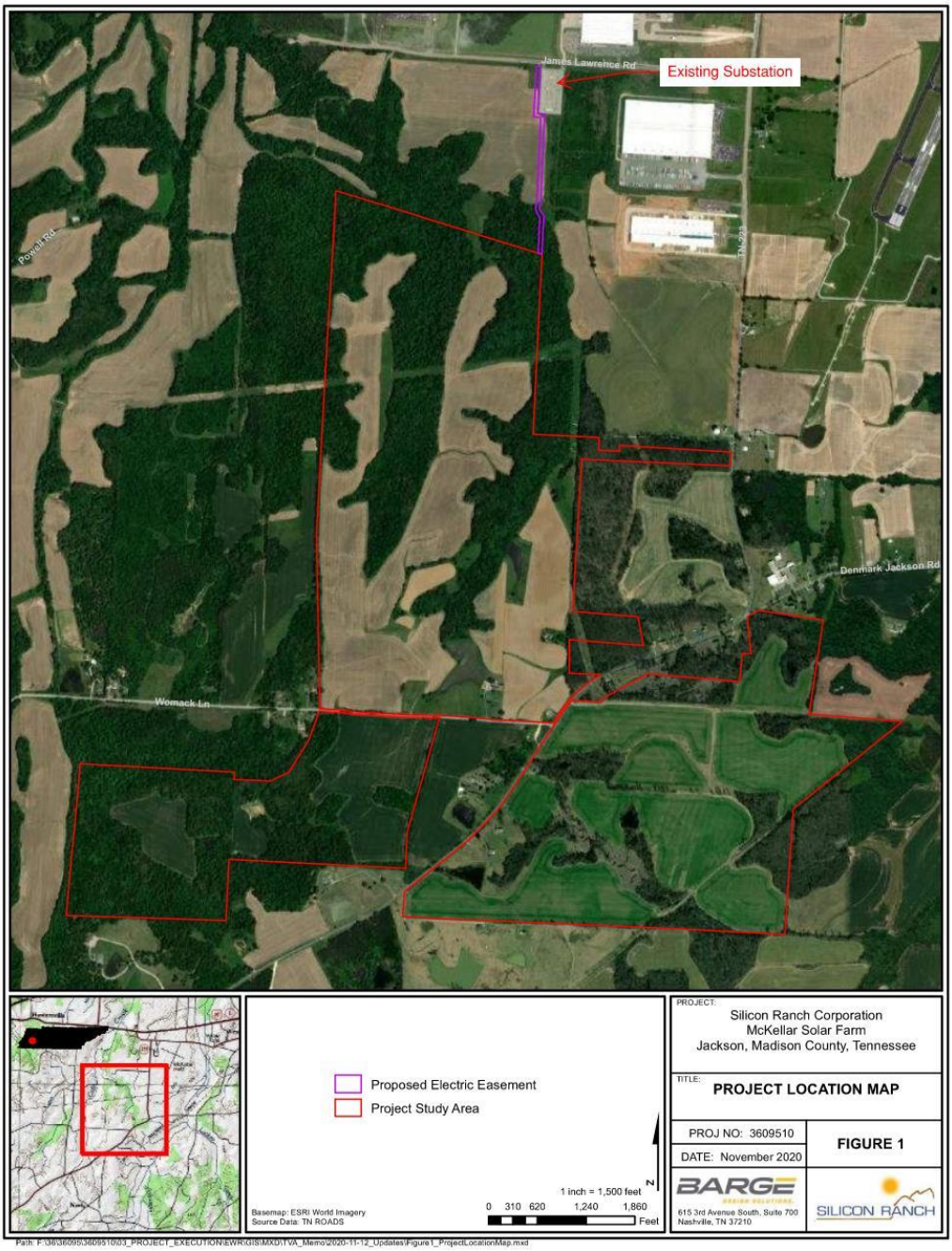

Figure 1. McKellar – Project Location

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

The National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321-4347) requires Federal agencies to evaluate the potential environmental impacts of their proposed actions. This EA has been prepared consistent with the Council on Environmental Quality (CEQ) regulations for implementing NEPA at 40 Code of Federal Regulations (CFR) 1500-1508 issued in 1978 (43 FR 55990, Nov. 29, 1978), with minor revisions in 1979 and 1986, as well as TVA regulations at 18 CFR 1318 issued in 2020 (85 FR 17434, Mar. 27, 2020). Because TVA began this EA before CEQ issued revised NEPA regulations (85 FR 43304-43376, Jul. 16, 2020), TVA applied the previously promulgated 1978 CEQ regulations and TVA's 2020 NEPA regulations in the preparation of this EA (see 40 CFR 1506.13). TVA's Proposed Action would result in the construction and operation of the proposed solar facility and connection to the existing McKellar, TN 161-kV Switching Station approximately 1,500 LF north of SR McKellar's northern boundary and adjacent to the proposed gentie by SR McKellar. The environmental review has been carried out to evaluate potential impacts of TVA's Proposed Action (the purchase of power under the PPA) and potential impacts related to the construction and operation of the proposed project.

The following chapters describe the existing environment in the project site (Figure 1), analyze potential environmental impacts associated with the Proposed Action Alternative and the No Action Alternative and identify and characterize cumulative impacts resulting from the proposed project in relation to other ongoing or reasonably foreseeable proposed activities within the surrounding area of the project site. Potentially affected areas within and beyond the project site help define the area of impact. Chapter 3 discusses the extent of the area of impact with respect to certain environmental resources, e.g., impacts to archaeological resources are limited to areas of physical disturbance while impacts to historic architectural resources include structures within proposed project's viewshed.

TVA's commitment to purchase renewable power is contingent upon the satisfactory completion of an appropriate environmental review and TVA's determination that the Proposed Action will be "environmentally acceptable." To be deemed "environmentally acceptable," TVA must determine the project would not result in significant impacts to the human environment and is consistent with applicable Federal, state, and local environmental laws and regulations. As part of this process, TVA must evaluate potential impacts resulting from the location, operation, and/or maintenance of the proposed project and determine if the project is consistent with the purposes, provisions, and requirements of applicable Federal, state, and local requirements.

Considering the proposed project and identification of applicable laws, regulations, executive orders (EO), and policies, the following resource areas have been included for discussion and analysis within this EA: land use; geology, soils, and prime farmland; water resources; floodplains; biological resources; visual resources; noise; air quality and greenhouse gases (GHGs); cultural resources; solid and hazardous wastes; public and occupational health and safety; transportation; and socioeconomics and environmental justice.

1.4 PUBLIC AND AGENCY INVOLVEMENT

Federal, state and local agencies, interested federally-recognized Native American Tribes, elected officials, and other stakeholders have been sent notification announcing the draft EA's availability for review and comment for a 30-day period. Specifically, the Federal Aviation Administration (FAA) and McKellar-Sipes Regional Airport received a copy of the draft EA for review and comment for a 30-day period. An electronic version of the draft EA has been posted

on the TVA website where comments can also be submitted electronically. Public notices have been published in local newspapers soliciting comments from other agencies, the general public, and any interested organizations. TVA will receive responses over a 30-day comment period. TVA will carefully review any comments received on the draft EA and address them, as appropriate, in the final EA.

1.5 REQUIRED PERMITS AND LICENSES

Based on the scope of the proposed construction activities, as described in Chapter 2, the project would likely require a National Pollutant Discharge Elimination System (NPDES) construction general permit issued by the Tennessee Department of Environment and Conservation (TDEC). A general NPDES permit would require the development of a Stormwater Pollution Prevention Plan (SWPPP) and implementation of approved pollution prevention measures. In addition, the proposed stream crossings to accommodate the proposed interior access roads would require a general permit from TDEC (Section 401 of the Clean Water Act (CWA) Aquatic Alteration Resource Permit (ARAP) and the U.S. Army Corps of Engineers (USACE) (Section 404 of the CWA, Nationwide Permit (NWP) Pre-Construction Notification (PCN)). Appropriate building and electrical permits would be obtained from the Madison County Building Department and other local entities. If open burning is determined to be the best method for wood waste management, a burn permit would be obtained through the Tennessee Department of Agriculture, Division of Forestry. While Silicon Ranch is currently exploring the location of the construction and permanent access roads, all potential areas have been included in the environmental review. As currently proposed, permanent and construction access to the facility would be from Denmark Jackson Road and Womack Lane.

CHAPTER 2

2.0 DESCRIPTION OF THE ALTERNATIVES

As part of the environmental review, the EA analyzes and compares potential impacts related to each considered alternative.

This chapter focuses on the background and understanding of the evaluated alternatives by providing a description of each alternative, a comparison of these alternatives with respect to their potential environmental impacts, and identification of the Preferred Alternative.

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

2.1 NO ACTION ALTERNATIVE

The No Action Alternative provides for a baseline of conditions against which the impacts of the Proposed Action Alternative can be measured. Under this alternative, TVA would not purchase power though a 15-year PPA with SR McKellar. The solar facility would not be constructed and operated by SR McKellar. Within the project site, existing conditions, i.e., natural resources, visual resources, physical resources, and socioeconomics, would remain unchanged. The identified land would not be developed into a solar facility and TVA would rely on other energy sources to meet energy supply needs and increased renewable energies as described in the 2019 IRP.

2.2 PROPOSED ACTION ALTERNATIVE

The Proposed Action Alternative would provide for the installation and operation of a 70 MW AC solar facility in Madison County, Tennessee and for TVA's purchase of renewable energy from the facility under a 15-year PPA with Silicon Ranch. The proposed project would occupy approximately 432 acres on a 942-acre tract south of James Laurence Road, north and south of Denmark Jackson Road and Womack Lane in Jackson, Madison County, TN. While the design is in the process of being finalized, the conceptual plan includes monofacial solar modules (horizontal single axis) comprised of approximately 212,800 individual panels arranged over roughly 432 acres. The Proposed Action alternative would include an overhead transmission line, connecting the proposed substation on-site to the existing McKellar, TN 161-kV Switching Station. TVA would complete modifications to the McKellar, TN 161-kV Switching Station.

2.2.1 Solar Facility

The Proposed Action Alternative would result in the installation of approximately 212,800 individual solar panels arranged over roughly 432 acres of the 942-acre area. The solar arrays would likely be supported by steel piles which would either be driven or screwed into the ground to a depth of 6 to 10 feet. On-site sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected with underground wiring placed in trenches. The trenches would be approximately 3 to 4 feet deep and 1 to 4 feet wide. Figure 2 below provides the overall site layout for the Proposed Action Alternative.

The solar arrays utilized for the proposed facility would be composed of multiple thin-film PV modules, or panels. PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured,

an electric current is produced, which can be used as electricity (TVA 2014). The proposed facility would convert sunlight into DC electrical energy within thin-film PV panels (Figure 3).

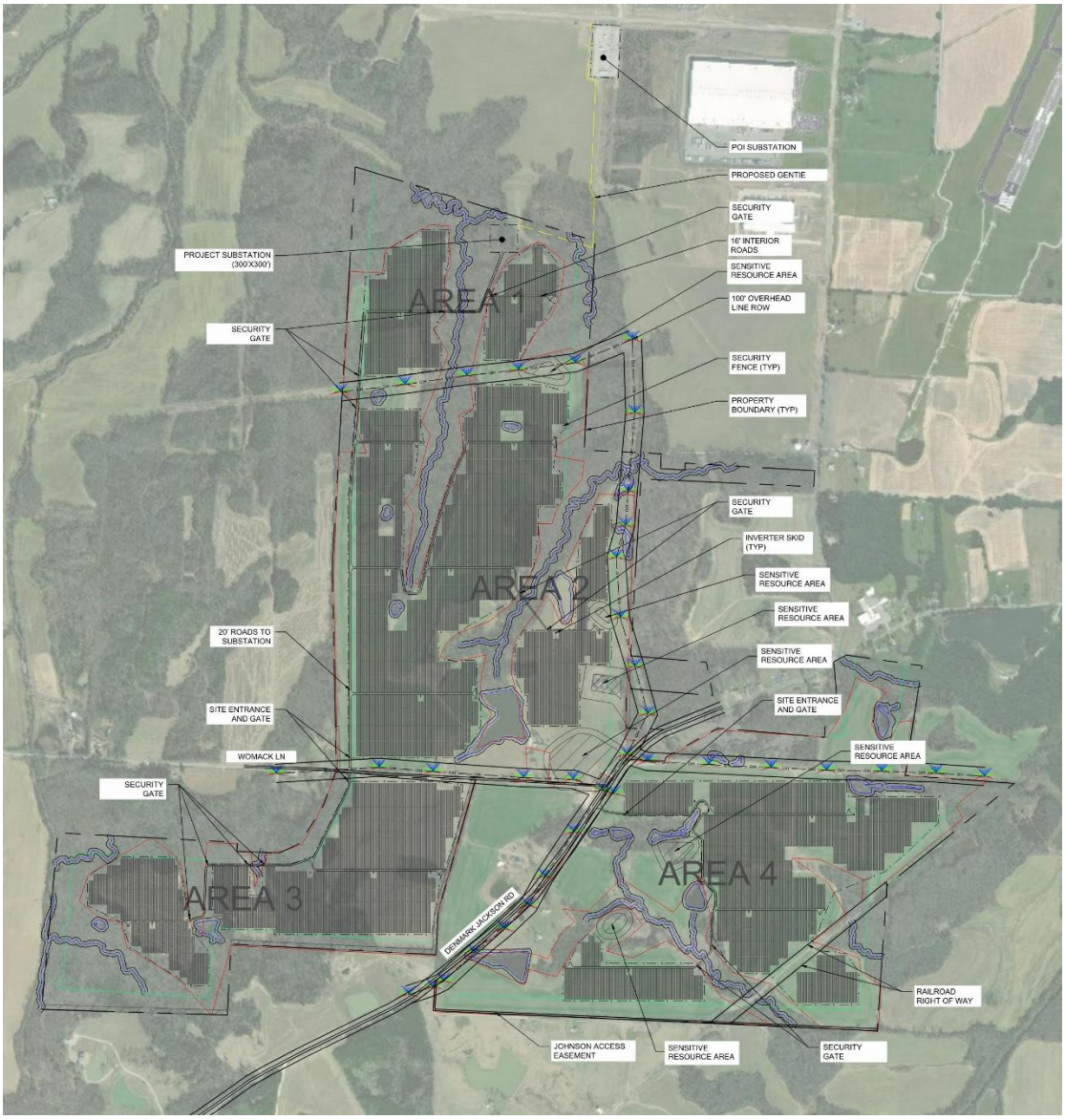

Figure 2. McKellar – Conceptual Layout

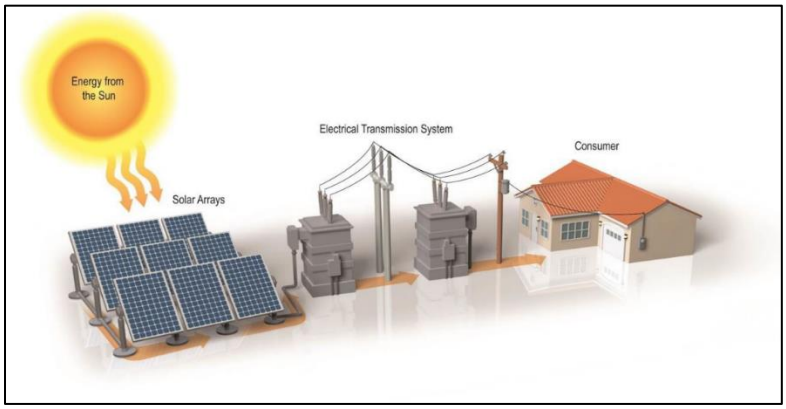

Figure 3. General energy flow diagram of PV solar system (not to scale)

The McKellar solar facility would be composed of approximately 212,800 PV panels, each capable of producing approximately 445 watts, mounted together in arrays (Figure 3). The arrays would connect to a total of 17 1,500V power inverters to convert the DC electricity generated by the solar panels into AC electricity, 17 4.4-mega volt amp (MVA) transformers for the project's electrical collection system, and a 34.5 kV overhead line connecting to the McKellar, TN 161-kV Switching Station.

The PV panels would be mounted on motor-operated axis tracker structures, commonly referred to as single-axis trackers. The axis trackers would be designed to pivot the panels along their north-south axes to follow the path of the sun from the east to the west across the sky. The tracker assemblies would be constructed in parallel north-south rows using steel piles installed using either a vibratory pile driver or helical piles with a depth of 6 to 10 feet below grade (Figure 4).

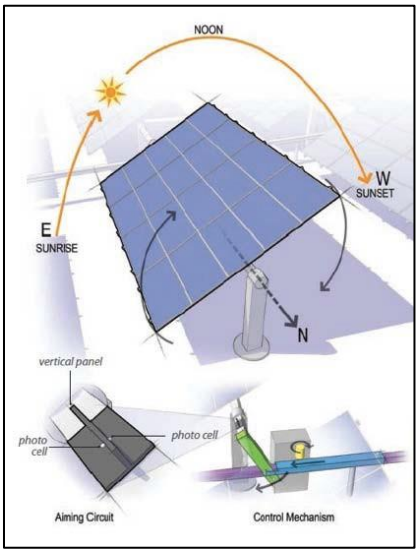

Figure 4. Diagram of single-axis tracking system (not to scale)

The PV modules would be electrically connected in series (called a "string") by wire harnesses that conduct DC electricity to combiner boxes. Each combiner box would collect power from a total of 28 strings of modules and feed a power conversion station via cables placed in excavated trenches. The excavated trenches would be approximately 3 to 4 feet deep and 1 to 4 feet wide. Each trench would be backfilled with project-site native soil and then appropriately compacted. Aboveground cables would be used to connect the modules to harnesses that lead wiring to combiner boxes.

The AC power from each individual inverter, typically 4400 kilowatt (kW), will be collected at an AC recombiner to be sent to the transformer. The underground voltage collection circuits will deliver AC electricity from the single transformer to the project's 34.5 kV line connecting to the existing McKellar, TN 161-kV Switching Station.

The PV panels would be installed in parallel north-south rows and arranged to avoid streams and wetlands. Note that several streams on site would be impacted by the proposed access roads. The arrays would contain an inverter and approximately 3,000 trackers of panels. Buried electrical

cables would connect the rows of PV panels to 1,500V power inverters, each connecting to the single pad-mounted 4.4 MVA transformer on site. The buried cables would continue from this transformer to the point of interconnection. As described above, all trenches for buried cables on the site would be backfilled with native soil, and the ground surface would be returned to its original grade. The energy produced from the 70 MW AC site would be sold to TVA.

2.2.2 Electrical Interconnection

The project would connect to a new 34.5 kV line from the proposed substation on-site to the existing McKellar, TN 161-kV Switching Substation. The proposed connection would span approximately 0.75 miles, with a 50-foot maintained easement. Approximately 15 poles, 60-65 feet above grade, spaced 300 feet apart are proposed as part of the Proposed Action Alternative. Construction would include clearing, minor grading at the pole locations, auguring pole locations, set poles and installing hardware, and stringing the conductor and fiber optic line.

As part of this project, TVA would complete transmission upgrades at the existing McKellar, TN 161-kV Switching Station. Note that the upgrades would occur within the existing footprint of the substation. The JEA would install the bus work, breaker B, and transformer. TVA would add the following facilities to the substation:

- Install a breaker with an isolating switch to create a sixth position in the existing ring configuration.
- Install a dual, standard step distance relay to protect the new bus to the solar plant.
- Maintain the breaker failure (BF) transfer trip (TT) to Madison West and to South Jackson.
- Provide redundant interconnection metering to consist of voltage transformers (VTs), current transformer (CTs), meters, test box, and cabling. Redundant real-time communications paths required.
- Install an APP digital fault recorder (DFR) for phasor measurement unit (PMU) capability and event analysis purposes. TT and relay pickups to trigger recording.
- Install a Power Quality Relay to provide a low priority alarm to Supervisory Control and Data Acquisition (SCADA) for harmonic distortion. Power Quality Relay tripping would also be wired to an open terminal block for possible future use.
- Replace Human Machine Interface (HMI) (funded by TVA).
- Supporting work at the TVA Jackson, TN 500-kV Substation would include installing pre-insertion resistors in each of the three capacitor banks. Work would be within the existing substation footprint.
- Install three phase CCVT’s or VT’s and surge arrestors at the new TL connection point.
- Install a new switch house for telecom and supporting equipment.

2.2.3 Construction

Construction of the solar power facility generally requires site preparation (surveying and staking, removal of tall vegetation and small trees, light grading and clearing, installation of security fencing, installation of erosion control Best Management Practices (BMPs), and preparation of construction laydown areas) prior to solar array assembly and construction, which includes driving steel piles for the tracker support structures, installation of solar panels and electrical connections, and system testing and verification.

SR McKellar is currently exploring the location of the construction and permanent access roads, keeping safety as the priority. These potential areas have been included in the environmental

review. As currently proposed, permanent access and construction access to the facility would be from Denmark Jackson Road and Womack Lane. Aquatic features, discussed later in the document, would be disturbed to accommodate proposed road crossings on-site. It is anticipated that permitting activities related to Sections 401 and 404 of the CWA (33 U.S.C. § 1251 et seq.) would be required.

Appropriate BMPs would be implemented and maintained during construction and operation of the facility. SRC's standard practice, which would be employed by SR McKellar, is to work with the existing landscape (e.g., slope, drainage, utilization of existing roads) where feasible to minimize or eliminate grading work to the greatest extent possible. Any required grading activities would be performed with portable earthmoving equipment and would result in a consistent slope to the local land. Prior to grading, native topsoil would be removed from the area to be graded and stockpiled on site for redistribution over the disturbed area after the grading is completed. Silt fences, sedimentation basins, and other appropriate controls would be used, as needed, to minimize exposure of soil and to prevent eroded soil from leaving the work area. Disturbed areas would be seeded post-construction using a mixture of certified weed-free, low-growing native grass seed obtained from a reputable seed dealer and in compliance with the requirements established by the local office of the Natural Resources Conservation Service (NRCS). Flowering seed mix will be placed in designated disturbed areas onsite, not to interfere with the proposed panel layout and modules. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is permanently stabilized. Water would be used for soil compaction and dust control during construction.

Grading would consist of the excavation and compaction of earth to meet the final design requirements. Limited to no grading is expected at the project location as the site is relatively flat and would not require any off-site or on-site hauling. Chipping and spread of minimal debris from tree clearing on the site would occur to minimize construction wastes. If burning occurs, only vegetation and untreated wood would be burned, and no burning of other construction debris is anticipated. If open burning is determined to be the best method for wood waste management, a burn permit would be obtained from the Madison County Fire Department.

The project site includes impaired stream channels, including Cub Creek, unnamed tributaries to Cub Creek, and tributaries to Johnson Creek (TDEC 2020). The impaired streams and identified surface waters within the associated watersheds require a 60' buffer. Under the Proposed Action Alternative, as part of the SR McKellar land purchase agreement, approximately 60-70 percent of the trees on-site would be harvested. Following purchase of the property, SR McKellar would clear the majority of the remaining trees within approximately 209 acres of the project site to accommodate the proposed solar facility and reduce shading on the panels. Non-mechanical tree clearing is proposed within the stream and wetland buffer areas and wetlands to accommodate the Proposed Action Alternative. Stumps would be left in place to reduce ground disturbance within the buffer and wetland areas. The SWPPP would reflect the proposed tree clearing, including justification for impact and proposed erosion and sediment control measures to maintain water quality. No chipping or spread of debris would occur within the wetland areas. Apart from removal of tall vegetation through non-mechanical means and leaving the roots in place, wetlands would be avoided during construction to the greatest extent practicable. Direct minor stream impacts are required to accommodate the proposed access roads within the solar facility. Once sensitive areas are marked, construction areas would be

cleared and mowed of vegetation and miscellaneous debris. Mowing would continue as needed to contain growth during construction.

To manage stormwater during construction, sediment traps and erosion control silt fence would be utilized. All wetlands would be buffered and protected by erosion control silt fences. Avoided streams would be buffered and protected by erosion control silt fences. Sediment traps would be placed in strategic drainage areas to prevent sediment from entering on-site streams and wetlands. Off-site sediment migration would be minimized by the placement of silt fences around the entire area to be cleared. These stormwater BMPs would prevent sediment from entering on-site streams and wetlands and prevent sediment migration off site.

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

Construction would be sequenced to minimize the time that bare soil on the disturbed areas is exposed. As described above, silt fences would surround the perimeter of the area to be cleared and graded. Other appropriate controls such as temporary cover would be used as needed to minimize exposure of soil and to prevent eroded soil from leaving the work area. Disturbed areas including but not limited to road shoulders, laydown areas, ditches, and other project-specific locations would be seeded post-construction. If conditions require, soil would be stabilized by mulch or seed. Where required, hay mulch would be applied at 3 tons per acre and well distributed over the area. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is considered permanently stable. As part of NPDES permit authorization (see Section 1.4), a site-specific SWPPP would be finalized with the final grading and civil design and would address all construction-related activities prior to construction commencement.

The design of the tracker support structures could vary depending on the final PV technology and vendor selected. Typical installations of this type are constructed using steel support piles. The driven steel pile foundation is typically galvanized and used where high load bearing capacities are required. The pile is driven with a hydraulic ram. Soil disturbance is restricted to the pile insertion location with temporary disturbance from the hydraulic ram machinery, which is about the size of a small tractor. Screw piles are another option for PV foundations which are driven into the ground with a truck-mounted auger. Screw piles create a similar soil disturbance footprint as driven piles.

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

The proposed project would include a new 34.5 kV overhead transmission line (TL) that would connect from the proposed substation on-site to the McKellar, TN 161-kilovolt (kV) Switching Station. The TL would be approximately 0.75 mile long and include a 50-foot-wide maintained easement. After the equipment is electrically connected, electrical service would be tested, and

motors and their controllers would be checked. As the solar arrays are installed, the balance of the facility would continue to be constructed and installed, and the instrumentation would be installed. Once all the individual systems have been tested, integrated testing of the project would occur.

Within the 942-acre solar facility site, the 432-acre area containing the solar arrays and associated electrical infrastructure would be securely fenced with either 7-foot-high deer fencing with three strands of barbed wire on top or 7-foot-high chain-link fencing with three strands of barbed wire on the top throughout construction and the operation of the project. Note, the 34.5 kV overhead TL would not be fenced (a 50-foot-wide easement would be maintained). Construction activities would take approximately 12 months to complete using a crew of approximately 275 to 300 people at the peak of construction. Work would generally occur 6 days per week (Monday through Saturday) from 7:00 am to 5:00 pm. Additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities.

2.2.4 Project Operations

During operation of the solar facility, minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement, inverter air filter replacement, fence repair, vegetation control, and periodic array inspection, repairs, and maintenance. The Proposed Action Alternative would implement an integrated vegetation management plan, including biological (i.e., managed sheep grazing), mechanical, and chemical controls as needed. Traditional trimming and mowing would be performed periodically (about 4 mowing events per year) to maintain the vegetation at a height ranging from 6 inches to 2 feet. Selective use of herbicides may also be employed around structures to control weeds. Products would be used as needed to control noxious weeds per local, state, and federal regulations and would be applied by a professional contractor.

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

The project site would not be staffed during operation; however, inspection and maintenance would be required biannually and in the case of equipment failures. At these times, up to four people would be on site for up to four days. Biannual inspections would involve drawing transformer oil samples and identifying any physical damage to panels, wiring, and interconnection equipment. Vegetation on the site would be maintained to control growth and prevent shading of the PV panels or interference with the tracking mechanisms. Traditional trimming and mowing would be performed on a quarterly basis, depending on growth rate, to maintain the vegetation. Selective use of spot herbicides may also be employed around structures to control any invasive weed outbreak. Precipitation in this region is adequate to remove dust and other debris from the PV panels while maintaining energy production; therefore, manual panel washing is not anticipated unless a specific issue is identified. The proposed project facility would be monitored remotely to identify any security or operational issues. If a problem is discovered

during nonworking hours, a repair crew or law enforcement personnel would be contacted if an immediate response was warranted.

2.2.5 Decommissioning and Reclamation

Following the expiration of the 15-year PPA with TVA, SR McKellar would reassess the site operation and determine whether to cease operation or attempt to enter into a new PPA or other arrangement. If TVA or another entity is willing to enter into such an agreement, the facility would continue operating. If no commercial arrangement is possible, the facility would be decommissioned and dismantled and the site restored. In general, the majority of decommissioned equipment and materials would be recycled. Materials that cannot be recycled would be disposed of at approved facilities. SR McKellar would develop a decommissioning plan to document recycling and disposal of materials in accordance with applicable regulations.

2.3 COMPARISON OF ALTERNATIVES

This EA evaluates the potential environmental effects that could result from implementing the No Action Alternative or the Proposed Action Alternative at the proposed solar facility in Madison County. The analysis of impacts in this EA is based on current and potential future conditions on the property and within the surrounding region. The summary and comparison of impacts by alternative for each resource area evaluated is provided in Table 1.

2.4 MITIGATION MEASURES

SR McKellar would implement the following minimization and mitigation measures in relation to resources potentially affected by the proposed project:

- Comply with the terms of the SWPPP prepared as part of the NPDES permitting process and implement other routine BMPs, such as non-mechanical tree removal within surface waters and buffers, placement of silt fence and sediment traps along buffer edges, and proper vehicle maintenance to reduce the potential for adverse impacts to groundwater.
- Design of the final layout would minimize direct impacts to aquatic features.
- Comply with the conditions of the TDEC Section 401 and USACE 404 of the CWA (33 U.S.C. § 1251 et seq.) permits, as applicable.
- Limit tree clearing from August 1st to March 31st to avoid adverse impact to federally listed bat species in accordance with commitments outlined in the Endangered Species Act Section 7(a)(2) consultation with USFWS {in progress}.
- A letter agreement is in place between SR and TVA to avoid identified cultural resources and associated 20 meter buffer on the site during construction and through operation of the proposed solar facility.
- Should traffic flow be a problem for local residences, churches, and school, SRC would consider staggered work shifts to space out the flow of traffic to and from the project site. Use of such mitigation measure would minimize potential adverse impacts to traffic and transportation to less than significant levels.

2.5 THE PREFERRED ALTERNATIVE

The Proposed Action Alternative has been identified as the Preferred Alternative. Under this alternative, a PPA between TVA and SR McKellar would be executed, leading to SR McKellar's construction and operation of the proposed solar facility. The Preferred Action Alternative would meet TVA's purpose and need.

Table 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 and indirect adverse impacts are anticipated. A small portion of agricultural land would be lost due to project development.
Geology, Soils, and Prime Farmland	No impacts anticipated	Geology and Soils: Minor direct impacts to geology and soils, resulting from minor to minimal increases and erosion and sedimentation are anticipated during construction and operation. While in operation, adverse impacts to soils would be offset by beneficial effects of vegetative management. Farmland: Minor impacts to prime farmland are anticipated; no permanent or irreversible conversion of farmland would occur.
Water Resources	No impacts anticipated	Groundwater: No direct adverse impacts are anticipated; minor beneficial indirect impacts to groundwater due to reduction in fertilizer and pesticide agricultural use for the duration of the project. Surface Water: Minor direct impacts to streams anticipated to accommodate the proposed access roads. Minor indirect impacts to water resources could occur from stormwater runoff during construction. Minor direct impacts to forested wetlands are anticipated from non-mechanical tree removal. No grading or ground disturbance is proposed within wetland areas. Floodplains: No direct or indirect impacts are anticipated from the development of the solar facility. No significant impact on floodplains and their natural and beneficial values are anticipated.
Biological Resources	No impacts anticipated	Vegetation: Direct impact to vegetation by clearing up to approximately 304 acres of trees and other tall vegetation within the project site proposed for development. With revegetation of native and noninvasive species, impacts are not expected to be significant. Wildlife: Displacement of wildlife due to clearing and construction. Significant impacts to migratory birds are not anticipated with avoidance of breeding season during vegetation removal. Minor impacts on common wildlife species due to the existence of project components and increased human presence. Rare, Threatened and Endangered Species: Section 7 consultation under ESA is underway regarding potential effects to the federally listed Indiana bat and northern long-eared bat due to the loss of potential summer roosting habitat. With minimization measures impacts are not expected to be significant.
Visual Resources	No impacts anticipated	Temporary, minor direct impacts on visual resources are anticipated during the construction phase due to increased traffic. While the views from surrounding properties may be slightly affected, the overall appearance of the solar panels would blend in with the nearby airport and industrial and commercial facilities.
Noise	No impacts anticipated	Minor temporary direct impacts would occur during construction activities. Minimal to negligible impacts during operations and maintenance.

Air Quality and Greenhouse Gas Emissions	No impacts anticipated	Air quality: Minor direct impacts to air quality would occur during construction activities from operation of equipment. No negative impacts to air quality are anticipated as a result of operation of the project. Greenhouse gas emissions: Temporary impacts to GHG emissions expected during construction would be negligible. Offsetting beneficial effects would also occur due to the nearly emissions-free power generated by the solar facility, offsetting power that would otherwise be generated by the combustion of fossil fuels.
Cultural Resources	No impacts anticipated	No direct or indirect impacts to architectural resources are anticipated from the development of the solar facility. No direct or indirect impacts to archeological sites are anticipated with a 20 meter buffer avoidance of the five (5) recommended NRHP undetermined sites.
Solid and Hazardous Wastes	No impacts anticipated	Minor adverse impacts anticipated from development of the solar facility. Construction waste generated during construction activities would be directed to local landfills. Hazardous wastes would be handled, stored, and disposed of in accordance with the SWPPP. Impacts during system operation would be negligible through implementation of a recycling program. No adverse effects to waste management are anticipated with the use of BMPs.
Public and Occupational Health and Safety	No impacts anticipated	Minor temporary adverse impacts during construction. No adverse effects are anticipated with the use of BMPs. No public health or safety hazards are anticipated from operation of the solar facility.
Transportation	No impacts anticipated	Minor temporary adverse impact during construction. No direct impacts to transportation are anticipated during operation. No indirect impacts to transportation are anticipated from operation of the solar facility.
Socioeconomics and Environmental Justice	No impacts anticipated	Socioeconomics: Minor beneficial direct, indirect, and cumulative impacts during construction and operation and maintenance activities by creation of local jobs and potential for expansion of future solar energy systems into the region. Environmental Justice: No disproportionately adverse impacts are anticipated to minority or low-income populations.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3 discusses the existing environmental, social, and economic conditions of the proposed project site and surrounding areas with potential to be impacted by the proposed activities. In addition to the existing conditions, potential environmental effects associated with each considered alternative are identified and discussed throughout the chapter.

3.1 LAND USE

Considering the proposed actions, the project site and surrounding properties' land use have been included in the evaluation of potential impacts. This section provides a discussion of the existing land use within and surrounding the project site and potential impacts to land use associated with the No Action and Proposed Action Alternatives.

3.1.1 Affected Environment

The subject property lies approximately 7 miles southwest of the center of Jackson, TN in a predominantly rural, agricultural area of Madison County, near the McKellar-Sipes Regional Airport. There are some adjacent single-family residential parcels surrounding the project site and a few industrial facilities to the north, but the project is largely surrounded by agricultural properties.

There are approximately 40 residential structures within one-half mile of the project site. The vast majority of these are single family structures of varying ages and are on one-acre or larger lots. McKellar-Sipes Regional Airport is located east of Smith Lane and north of Denmark Jackson Road. Two religious institutions, the Old Denmark Road Church of Christ and the New Life Church of Jackson, are located near the eastern boundary of the property, on Denmark Jackson Road near its intersection with Smith Lane. Old Denmark Road Church of Christ is west of Smith Lane with New Life Church of Jackson just east of the intersection.

The 942-acre project site is located approximately 470 feet above sea level at -88.936767, 35.5751412. The more central portions of the site, especially those that have been cultivated are relatively flat, sloping gently towards the wooded perimeter areas of the site which are approximately 50 feet lower in elevation. The project site is currently used for agriculture and residential purposes. The landscape includes agricultural fields planted with wheat, corn, or soy, hardwood forests, grass fields, and other areas covered by secondary growth vegetation. Cub Creek and an unnamed tributary to Cub Creek are located along the western portion of the project site. Unnamed tributaries to Johnson Creek and wetlands are located throughout the project site. Industrial development borders the north-eastern portion of the site, along Smith Lane and James Lawrence Road. To the west of the proposed gentie is a combination of maintained agricultural and forested area. There is a small forested area between the proposed gentie and existing industrial development along Smith Lane.

There are several structures and residential homes within the project site. A two-story brick house is located on the north-eastern portion of the site. A single-story residential structure, two wooden barns, and silo are located at 36 Womack Road (approximately 278 feet north of Womack Road). A residential house is located at 741 Denmark Jackson Road, facing east (approximately 750 feet north of Denmark Jackson Road) with several agricultural buildings, including a dairy parlor, shed,

and metal silo. Lastly, a residential house is located east of Denmark Jackson Road, approximately 635 feet south of Womack Road within the project site.

A 100' overhead line right-of-way exists on-site, crossing east-west in the northern portion of the project site. The easement continues south, along the eastern boundary of the project site to Denmark Jackson Road.

The site is currently zoned as Forestry-Agriculture-Recreation (FAR) (Madison County 2015); however, as part of the development process, the project site would be rezoned to I-2 (Manufacturing and Warehousing). During the rezoning and planning process with the Madison County Commission and Planning Commission, project neighbors would be notified of project hearings.

No recreation or natural areas are located within a ½ mile of the project site.

3.1.2 Environmental Consequences

3.1.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be built, and the land uses of the site would not change. Existing land use would be expected to remain a mix of agricultural, forested, and residential land for the foreseeable future.

3.1.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, the development of the solar facility would result in the conversion of the site from agricultural to industrial use. Given the rural nature of the project site and surrounding area, the Proposed Action Alternative would introduce a larger industrial footprint than the existing industrial developments located along Smith Lane and James Lawrence Road. However, Madison County has previously expressed a desire to focus industrial growth in the nearby areas surrounding the airport in the One Jackson Civic Master Plan (Jackson 2015). No significant impacts to land use are expected as a result of the Proposed Action Alternative. Any portions of the project site outside of the 432-acre solar facility footprint, associated gentie, and substation would remain undeveloped with no farming activities or other activities occurring other than general maintenance as required for operation of the facility. Installation of the solar facility would increase industrial development in this portion of Madison County, TN.

If the facility were to be decommissioned, the majority of land could be returned to agriculture or other use as allowed by local zoning regulations. Note that the land currently maintained within the existing 100' right-of-way on-site would continue to be maintained under the Proposed Action Alternative.

There are no outdoor recreation areas in the vicinity of the project site; development of the project would not impact public recreational activities or facilities associated with recreational activities. Additionally, development of the solar facility would be consistent with local land use planning and zoning. Therefore, no adverse impacts on land use are anticipated. Since the TVA substation modifications would occur within the footprint of the existing substation, no land-use related impacts would occur from the proposed modifications.

3.2 GEOLOGY, SOILS, AND PRIME FARMLAND

Considering the proposed actions, geology, soils, and prime farmland have been included in the evaluation of potential impacts. This section provides a discussion of the existing geology, soils,

and prime farmland within the project site and potential impacts to geology, soils, and prime farmland associated with the No Action and Proposed Action Alternative.

3.2.1 Affected Environment

3.2.1.1 Geology

The site is located in the Gulf Coastal Plain physiographic province, which extends from the Florida Panhandle to eastern Texas and from Kentucky to the Yucatan Peninsula in Mexico. The project is located in Madison County, which is within the East Gulf Coastal Plain section that dates to the Quaternary Period. The landscape varies greatly in topography from rolling hills near the Appalachian Mountains to the flat sandy coastal regions near the Gulf of Mexico (National Park Service [NPS] 2018).

3.2.1.2 Paleontology

During the Cenozoic era, Western Tennessee was a shallow, tropical sea. The best-preserved fossils within Western Tennessee are Mesozoic in age and found within the Coon Creek formation. The Coon Creek formation is known for its extremely well-preserved crustaceans and mollusks, including a small bivalve*, Pterotrigonia thoracica*, the official state fossil of Tennessee. The project site is located approximately 30 miles west of any mapped section of the Coon Creek formation; therefore, it is unlikely that any significant fossil remains are present within the project boundary as the area is not typically associated with paleontological finds.

3.2.1.3 Geological Hazards

Potentially hazardous geological conditions can include the following: landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. The 942-acre project site does not have conditions for a majority of these types of hazards. The project site is located on relatively stable ground and no significant slopes are present within several miles; therefore, landslides are not a potential risk. No volcanoes are present within several hundred miles of the project site. The predominant geologic unit on the west side of Madison County is Quaternary-aged loess. The project site lacks the carbonate bedrock geology and karst landforms associated with sinkholes.

Seismic activity at the site could cause surface faulting, ground motion, ground deformation, and conditions including liquefaction and subsidence. The Modified Mercalli Scale is used within the United States to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of “g”, the acceleration due to gravity. The United States Geological Survey (USGS) Earthquake Hazards Program publishes a seismic hazard map (Figure 5) that display the PGA with 10 percent (1 in 500-year event) probability of exceedance in 50 years. The potential ground motion for the proposed project site is 0.46g, for a PGA with a 2 percent probability of exceedance within 50 years (USGS 2018).

3.2.1.4 Soils

The project site contains eighteen (18) known soil types. The predominant soil on the project site is Feliciana silt loam (FcB), comprising more than 31.6 percent of the on-site soil. The remaining

main soil types include Lexington silt loam, Smithdale soils, Grenada silt loam, and Loring silt loam. Figure 6 below shows the approximate distribution area of each soil type while Table 2 provides a list of soils identified within the area of interest (AOI), defined as the 942- acre project site and associated TL.

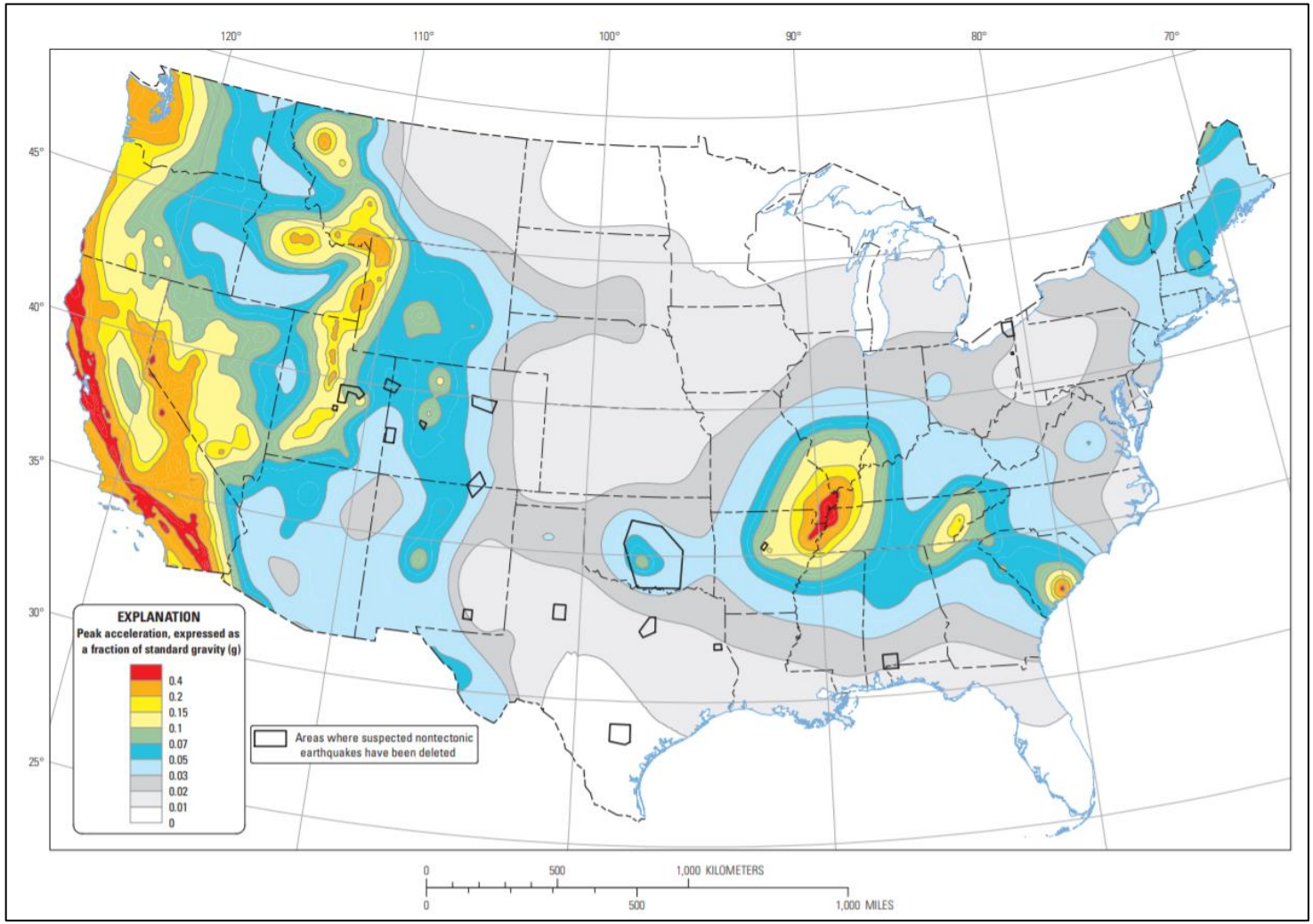

Figure 5. Ten-percent Probability of Exceedance in 50 Years Map of Peak Ground Acceleration

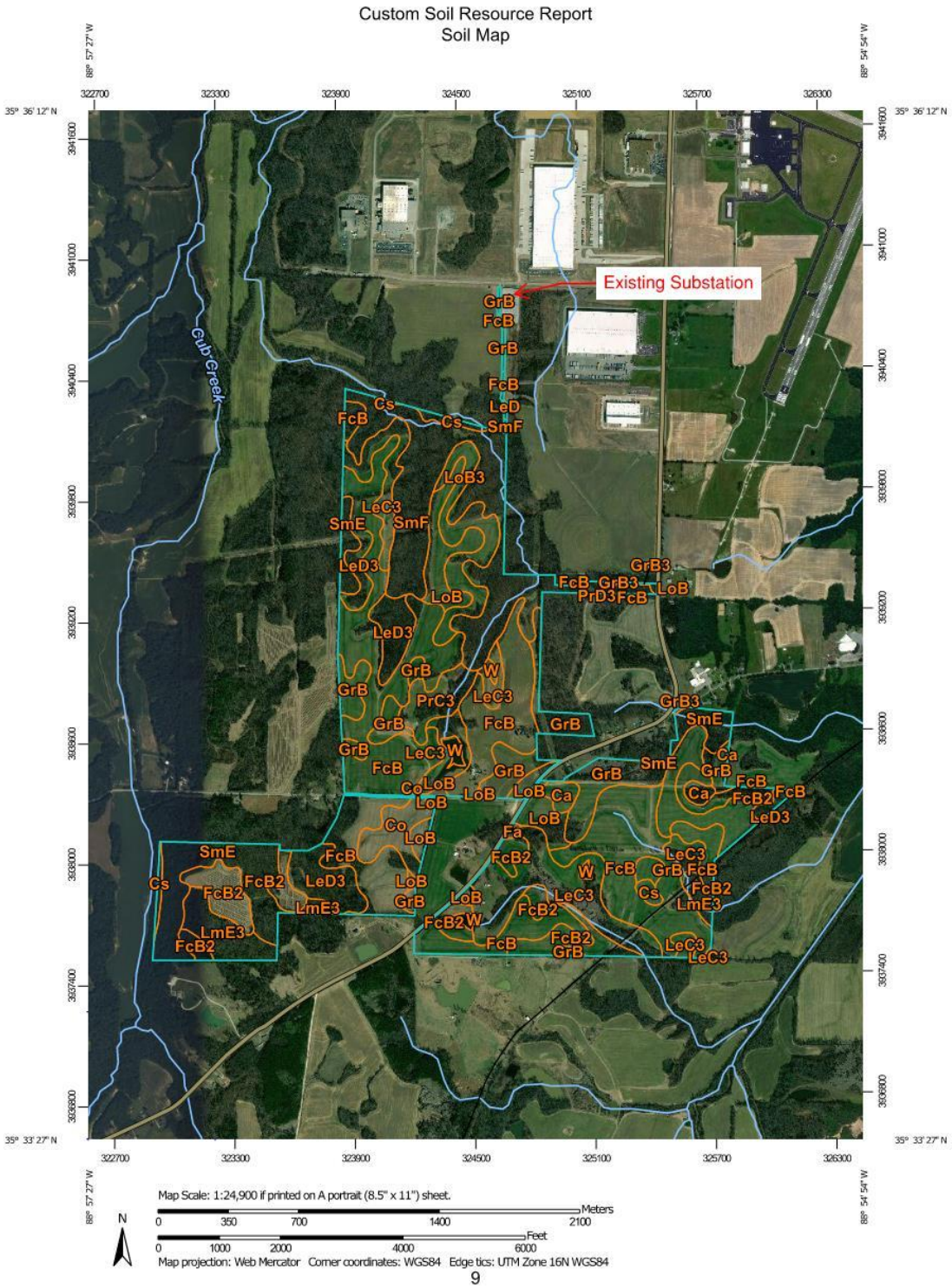

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Figure 6. Site Soil Map

Table 2. Site Soils

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ca	Calhoun and Henry silt loams	8.2	0.9%
Co	Calloway silt loam, 0 to 2 percent slopes	17.2	1.8%
Cs	Collins silt loam, 0 to 2 percent slopes, frequently flooded, brief duration	8.4	0.9%
Fa	Falaya silt loam	0.8	0.1%
FcB	Feliciana silt loam, 2 to 5 percent slopes, northern phase	296.2	31.6%
FcB2	Feliciana silt loam, 2 to 5 percent slopes, moderately eroded, northern phase	81.5	8.7%
GrB	Grenada silt loam, 2 to 5 percent slopes	76.5	8.2%
GrB3	Grenada silt loam, 2 to 5 percent slopes, severely eroded	0.4	0.0%
LeC3	Lexington silt loam, 5 to 8 percent slopes, severely eroded	98.8	10.6%
LeD	Lexington silt loam, 8 to 12 percent slopes	0.1	0.0%
LeD3	Lexington silt loam, 8 to 12 percent slopes, severely eroded	45.0	4.8%
LmE3	Lexington and Smithdale soils, 10 to 30 percent slopes, severely eroded	28.8	3.1%
LoB	Loring silt loam, 2 to 5 percent slopes	42.9	4.6%
LoB3	Loring silt loam, 2 to 5 percent slopes, severely eroded	31.0	3.3%
PrC3	Providence silt loam, 5 to 8 percent slopes, severely eroded	17.6	1.9%
PrD3	Providence silt loam, 8 to 12 percent slopes, severely eroded	2.5	0.3%
SmE	Smithdale soils, 10 to 20 percent slopes	63.3	6.8%
SmF	Smithdale soils, 20 to 30 percent slopes	111.5	11.9%
W	Water	6.1	0.7%
Totals for Area of Interest		**936.8**	**100.0%**

Source: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Below is a brief description of some of the more prominent soils identified on-site:

Feliciana silt loam (FcB) is a very deep, well drained, moderately permeable soil with 2 to 5 percent slopes. The depth to the water table is more than 80 inches and has low runoff. The Feliciana silt loam (FcB2) has 2 to 5 percent slopes, is well drained, and more than 80 inches to the water table. The Grenada silt loam (GrB) is 2 to 5 percent slopes, moderately well drained, and about 16 to 29 inches to the water table. The Lexington silt loam (LeC3) is severely eroded with 5 to 8 percent slopes. The parent material is loess over loamy marine deposits. This soil has more than 80 inches to the water table and is considered well drained. The Lexington silt loam (LeD3) is 8 to 12 percent slopes, severely eroded, and considered well drained. This soil is more than 80 inches to the water table. The Lexington and Smithdale soils (LmE3) are 10 to 30 percent

slopes, severely eroded and well drained. The Loring silt loam (LoB) is 2 to 5 percent slopes, about 26 to 35 inches to fragipan, and moderately well drained. The Loring silt loam (LoB3) is 2 to 5 percent slopes, severely eroded, moderately well drained and 10 to 35 inches to fragipan. The Smithdale soils (SmE) are 10 to 20 percent slopes, well drained, and more than 80 inches to the water table. The Smithdale soils (SmF) are 20 to 30 percent slopes, well drained, and more than 80 inches to the water table (USDA NRCS 2020).

Of the eighteen (18) soils identified on-site, three (3) soil units are considered hydric for Madison County, Tennessee, including: Calhoun and Henry silt loams (Ca), Collins silt loam (Cs), and Falaya silt loam (Fa). Combined, these three soil units account for less than three (3) percent of the AOI.

3.2.1.5 Prime Farmland

Prime farmland, as defined by the U.S. Department of Agriculture (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."

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

Of the eighteen (18) soils identified, nine (9) soil types are indicated as prime farmland, making up approximately 562 acres of the project site (about 60% of the on-site soils). These soils include: Ca (if drained), Co, Cs, Fa, FcB, FcB2, GrB, LoB, and LoB3.

3.2.2 Environmental Consequences

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no direct or indirect project related impacts on geological, paleontological, soil resources, or prime farmlands would result. Existing land use would be expected to remain a mix of farmland and forested areas. If current land use remains unchanged, impacts to soils from continued agricultural use could result from a depletion of nutrients, causing minor changes to the site.

3.2.2.2 Proposed Action Alternative

The following sections describe the anticipated impacts on geology, soils, and prime farmlands should the Proposed Action Alternative be approved and implemented.

Geology and Paleontology

Under the Proposed Action Alternative, minor impacts to geology could occur.

The solar arrays would be supported by steel piles which would either be mechanically driven into the ground to a depth of 7 to 9 feet. Trenching to approximately three feet would also be required for underground wiring connections between solar panels. On-site sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected with underground wiring placed in excavated trenches and backfilled with project-site native soil. Due to the small sizes of the subsurface disturbances, only minor direct impacts to potential subsurface geological resources are anticipated.

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

Ground disturbance would occur at specific locations within the proposed gentie to install poles to support the proposed TL. Poles would be installed at a depth of 10-15 feet. Due to limited areas of disturbance and the shallow nature of the proposed subsurface disturbances, only minor impacts to geological resources are anticipated.

Note, since the TVA substation modifications would occur within the footprint of the existing substation, no geology related impacts would occur under the Proposed Action Alternative.

Geologic Hazards

Hazards resulting from geological conditions would be minor because the project site is in a relatively stable geologic setting. There is a moderate potential for small to moderate intensity seismic activity. The facility would be designed to comply with applicable seismic standards prescribed in state and local building codes. A seismic event could cause minor impacts to the project site and equipment on the site. The project could be subject to potential adverse effects from ground failure associated with liquefaction during a strong seismic event. Structural damage to PV panels, PV panel support structures, and other associated equipment could occur. Since the site would not be staffed during operation, potential damage to on-site structures would pose very limited risk to humans. Geologic hazard impacts on the site would be unlikely to impact off-site resources.

The proposed poles associated with the gentie would be designed to comply with applicable standards. Potential impacts from seismic activity would be minimal and would be unlikely to cause adverse impacts to the proposed structures.

Further, since the TVA substation modifications would occur within the footprint of the existing substation, no new impacts from seismic activity to the substation is anticipated.

Soils

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

It is unlikely that the off-site soil resources would be necessary for construction. However, if borrow materials, such as sand, gravel, rip rap, or other aggregate are necessary during site preparation, resources may be obtained from nearby permitted off-site sources.

Minor disturbance to soils would occur during operation of the Proposed Action Alternative. The creation of new impervious surface, in the form of panel footings and the foundations for the inverter stations and substation would result in a minor increase in stormwater runoff and potentially increase soil erosion. In addition, vegetation clearing associated with the proposed gentie would result in minor increase in stormwater runoff and increases the potential for soil erosion. Use of BMPs such as soil erosion and sediment control measures would minimize the potential for increased soil erosion and runoff. Due to the project disturbance area being greater than one-acre, a NPDES Permit for discharges of stormwater associated with construction

activities would be required. Application for the permit would require submission of a SWPPP describing the management practices that would be utilized during construction to prevent erosion and runoff and those to reduce pollutants in stormwater discharges from the site. Following construction, implementation of soil stabilization and vegetation management measures would reduce the potential for erosion impacts during site operations.

During operation of the solar facility, minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement, inverter air filter replacement, fence repair, vegetation control, and periodic array inspection, repairs, and maintenance. The Proposed Action Alternative would implement an integrated vegetation management plan including biological (i.e., managed sheep grazing), mechanical and chemical controls as needed. Mechanized landscaping may include use of lawnmowers, weed eaters, etc. Traditional trimming and mowing would be performed periodically to maintain the vegetation at a height ranging from 6 inches to 2 feet. Selective use of herbicides may also be employed around structures to control weeds. Products would be applied by a professional contractor and used to control noxious weeds per local, state and federal regulations. Weather events, e.g., predicted rainfall or high winds, would be taken into account prior to application of herbicides in efforts to reduce potential runoff or drift. These maintenance activities would not result in any adverse impacts to soils on the project site during operations.

Note, since the TVA substation upgrades would occur within the footprint of the existing substation, no impacts to soils would occur from the proposed modifications.

Prime Farmland

A land evaluation and site assessment system is used by the USDA NRCS to establish a farmland conversion impact rating score (7 CFR § 658.4(c)(4)(ii)). When considering the impact rating score, project stakeholders must consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level (USDA 2014).

The construction and operation of the Proposed Action Alternative would result in temporary adverse effects to prime farmland during operation of the solar facility. There are approximately 184,000 acres of prime farmland in Madison County, accounting for roughly 51 percent of the total land area in the county. Nearly 60 percent, over 560.2 acres, of the project site soil is considered prime farmland. The majority of the solar array, which would cover approximately 432 acres within the project site, would be installed in areas identified as prime farmland. The development of the 942-acre area into the solar facility impacts a minimal portion of the total available farmland in the county. Ground disturbances for proposed gentie would be temporary during construction; no loss of prime farmland is anticipated from construction of the proposed gentie. Further, since the TVA substation modifications would occur within the footprint of the existing substation, no impacts to prime farmland are anticipated from the proposed modifications.

Any area within the project site not developed for the solar facility would remain undeveloped with no agricultural or other activities, aside from general maintenance of vegetation. Adhering to BMPs during construction and operation of the solar facility, including installing erosion control devices (ECDs) during stockpiling events, would preserve topsoil and limit erosion, resulting in negligible impacts to prime farmland.

Moreover, solar projects do not result in the permanent or irreversible conversion of farmland. 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 should the solar farm be dismantled. Based on the limited site disturbance, there would be minimal direct and indirect effects on prime farmland under the Proposed Action Alternative.

3.3 WATER RESOURCES

This section provides an overview of existing water resources within the project site, and the potential impacts on these water resources that would be associated with the No Action Alternative and Proposed Action Alternatives. Water resources discussed in this section include groundwater and surface water (wetlands and floodplains).

3.3.1 Affected Environment

3.3.1.1 Groundwater

Principal aquifers that underline the project site are the upper Claiborne, middle Claiborne, middle Wilcox, and lower Wilcox aquifers. These aquifers are all part of the Mississippi embayment aquifer system located in the Coastal Plain Physiographic Province (USGS 1995). There are no sole source aquifers designated by the U.S. Environmental Protection Agency (USEPA) in Madison County, based on available information from the USEPA (2020e).

3.3.1.2 Surface Water

Surface waters are defined as water features that are on the Earth's surface typically consisting of streams, lakes, ponds, and wetlands. Surface water features are further segregated into perennial, intermittent, and ephemeral. Tennessee also designates certain surface water features as wet weather conveyances (WWC). Perennial waters are permanent surface water features that have water present throughout the year. Intermittent classification is generally restricted streams that have a well-defined channel but only contain water part of the year, typically during winter and spring seasons when the stream bed is below the water table. Ephemeral streams or WWCs are features that only flow in direct response to precipitation events and typically exist as topographic swales and dry drainages with poor bed/bank development. Wetlands are those inundated by surface water or groundwater such that vegetation has adapted to saturated soil conditions (i.e., swamps, marshes, bogs).

This project site is located in Madison County and drains to waterways within the South Fork Forked Deer River (8-digit HUC 08010205) watershed and more specifically to the Johnson Creek Lower watershed (12-digit HUC 080102050303) and the South Fork Forked Deer River-Cub Creek (080102050305) watershed. Unnamed tributaries to Johnson Creek are located in the south-eastern portion of the project site. Cub Creek and tributaries to Cub Creek are located in the western and northern portion of the project site. Johnson Creek, Cub Creek and their associated watersheds are listed on the 303(d) list for physical substrate, physical habitat alterations, and sediment/siltation from channelization (TDEC 2020).

Surface water features in the project site were identified by a Tennessee Qualified Hydrologic Professional (TN-QHP) during a site visit. Prior to conducting the field survey, aerial photographs, USGS topographic maps, National Wetlands Inventory (NWI) maps, and soil survey maps were consulted to identify current and historic drainage patterns of the subject property and connectivity of potential wetlands to any other jurisdictional wetlands or waters of the U.S. A field investigation was conducted to evaluate areas of potential jurisdiction using procedures established for "routine

delineations" as found in the USACE 1987 Wetland Delineation Manual and with additional information as provided in the USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast Plain Region (Version 2.0) (USACE 2010).

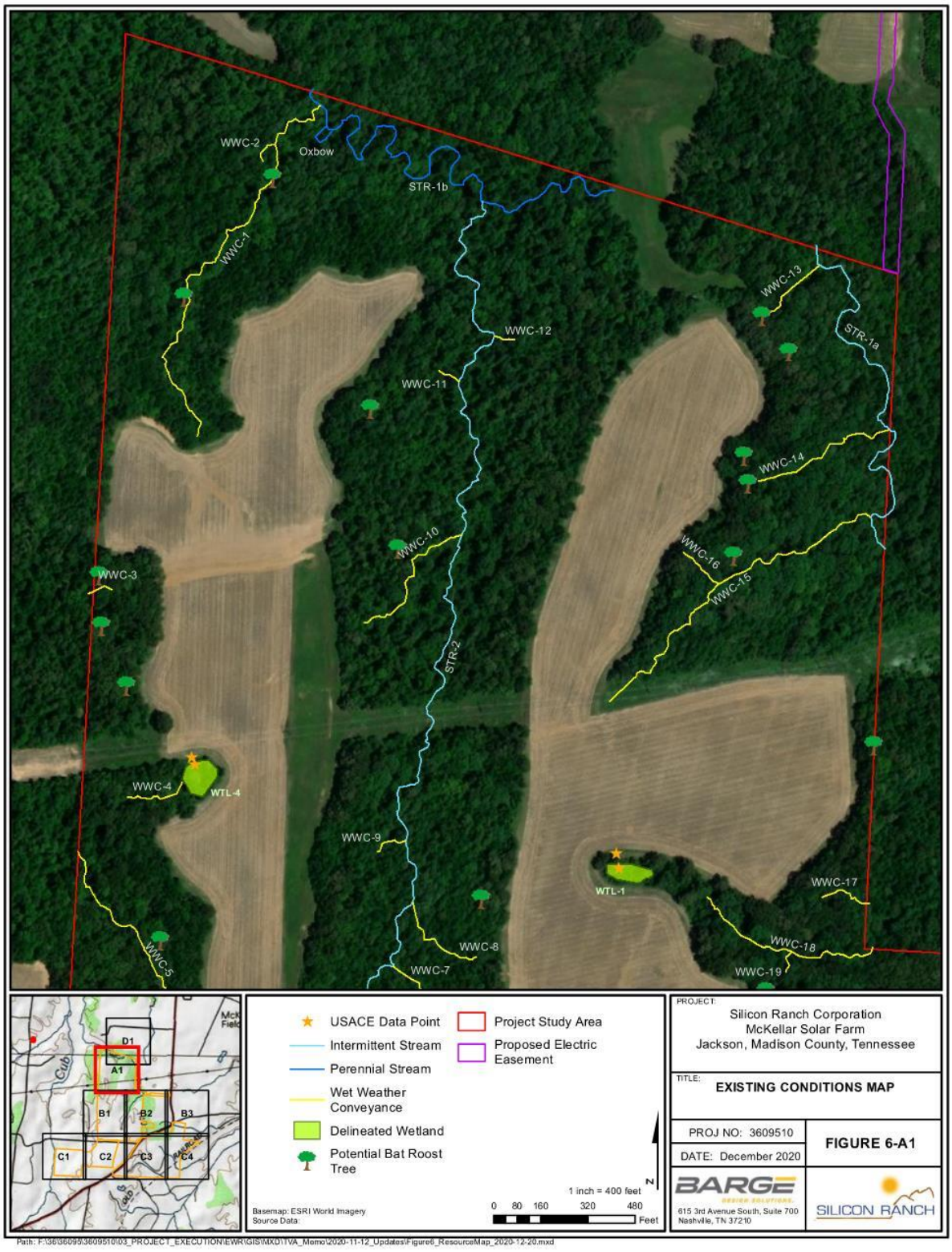

Figure 7a. Environmental Features

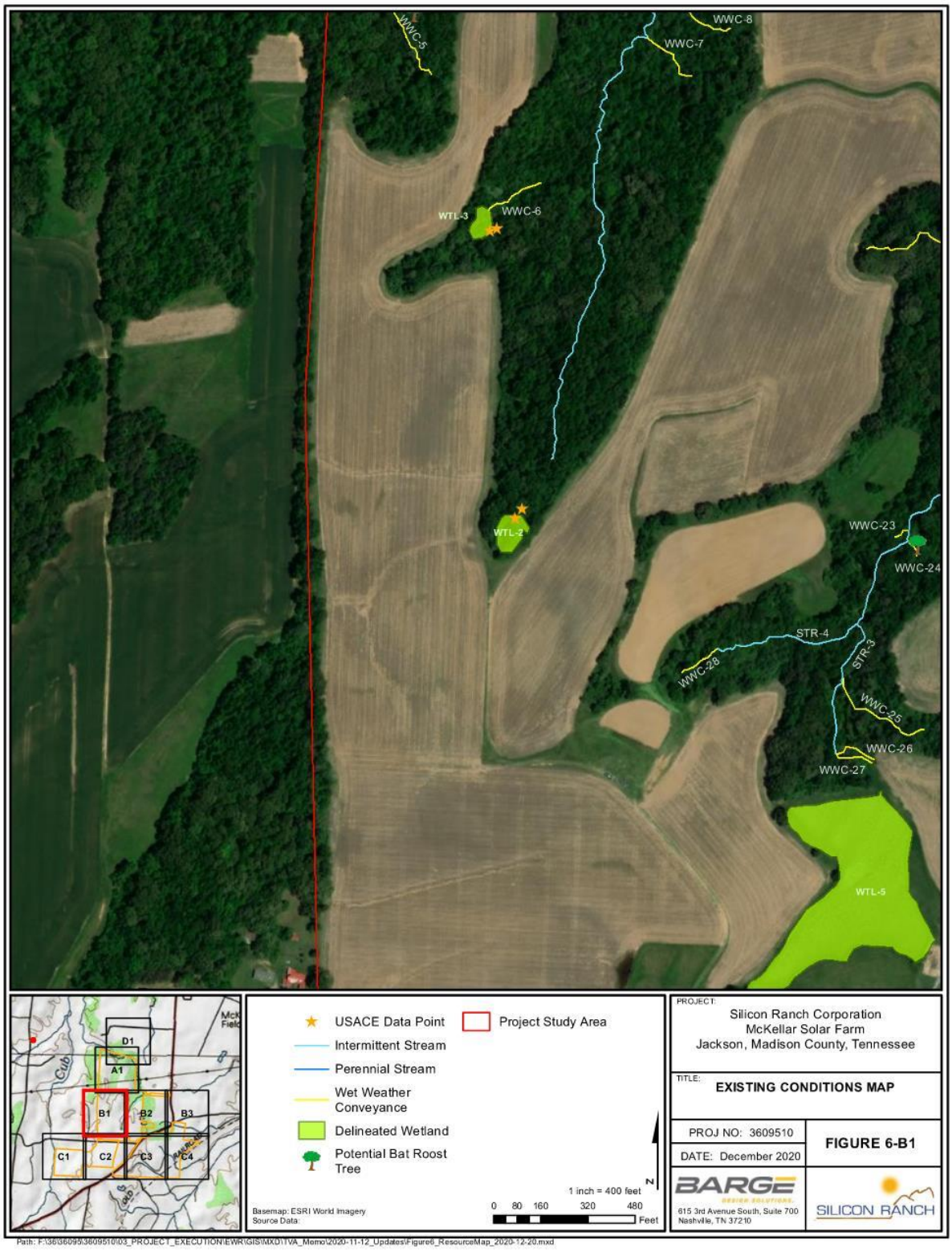

Figure 7b. Environmental Features

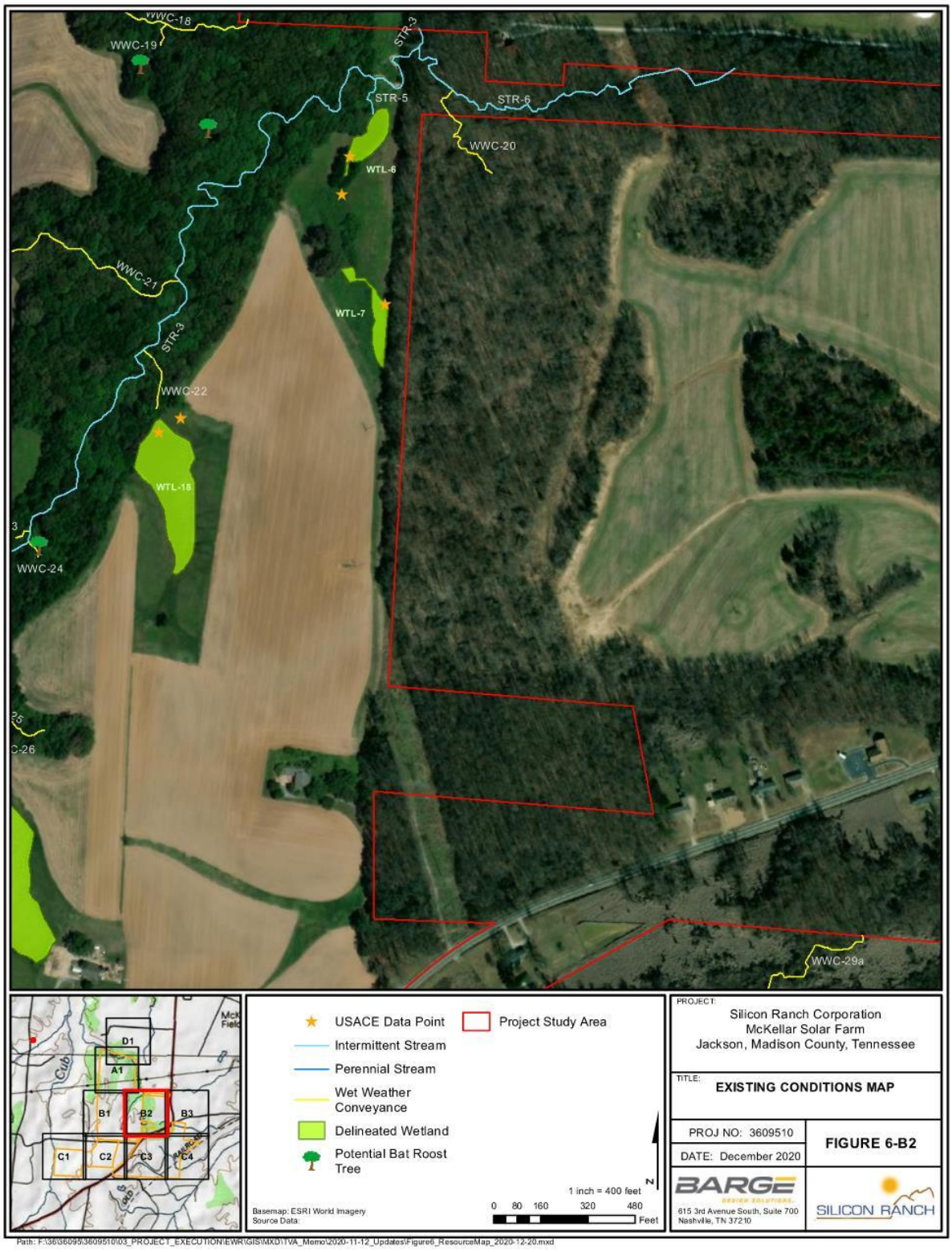

Figure 7c. Environmental Features

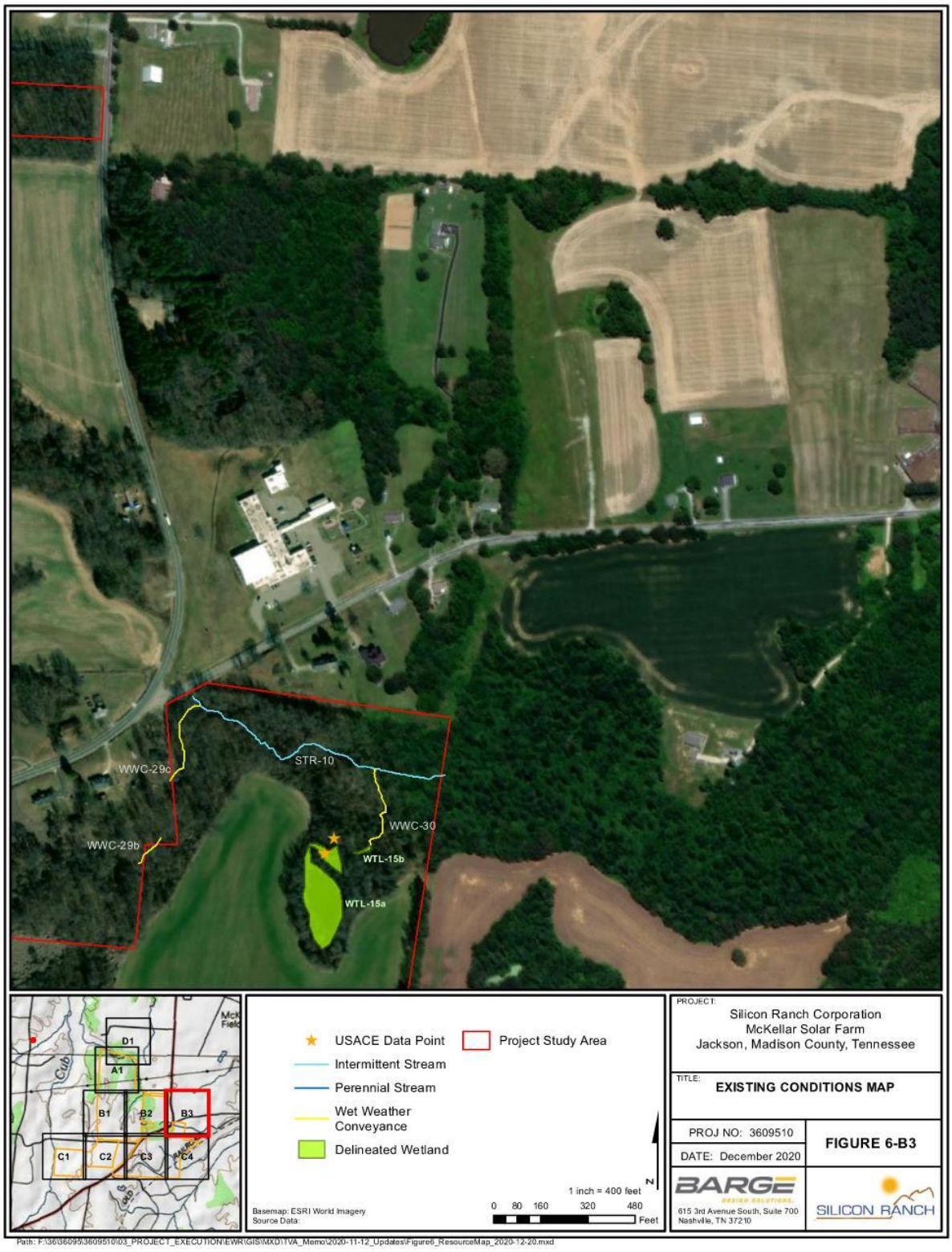

Figure 7d. Environmental Features

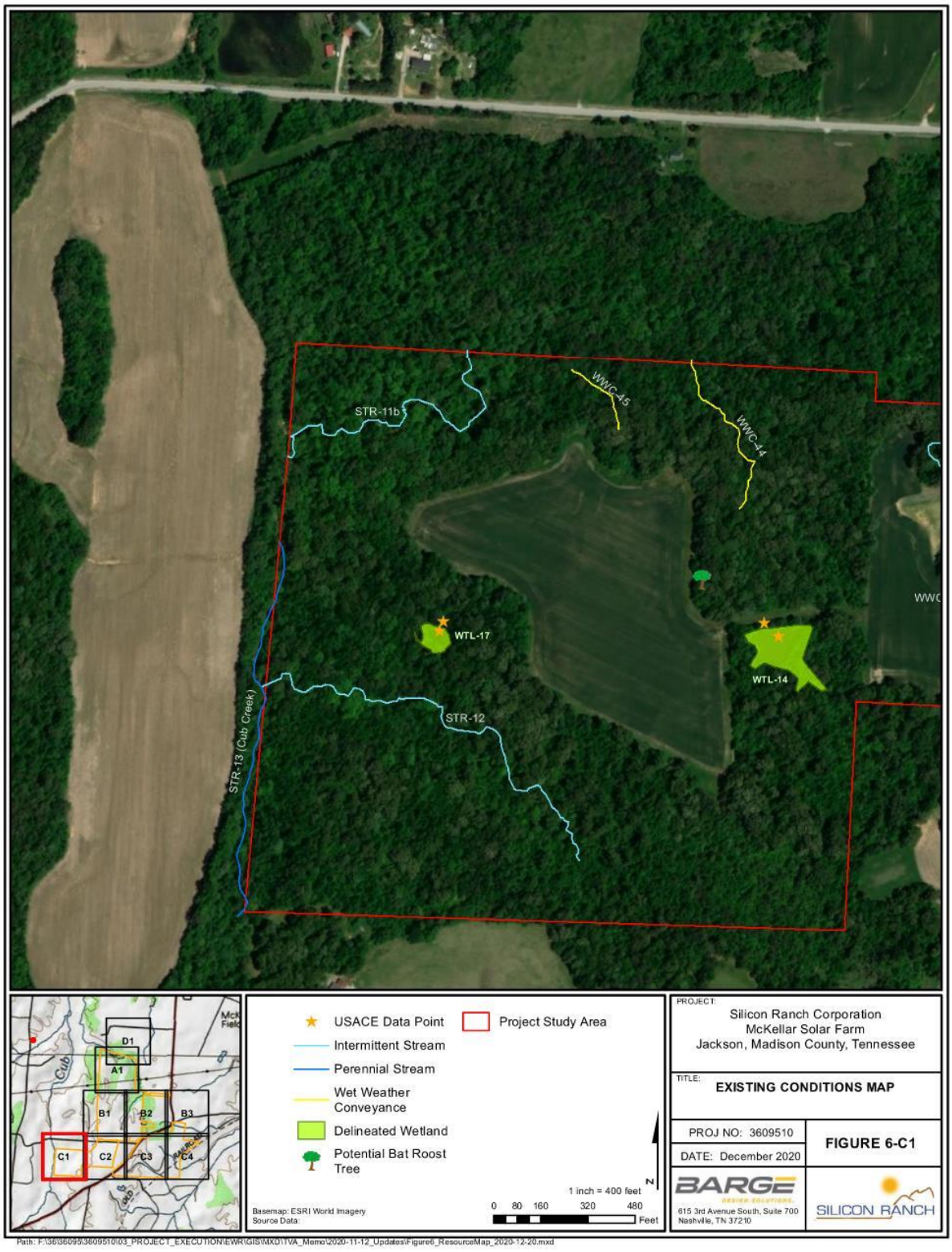

Figure 7e. Environmental Features

Figure 7f. Environmental Features

Figure 7g. Environmental Features

Figure 7h. Environmental Features

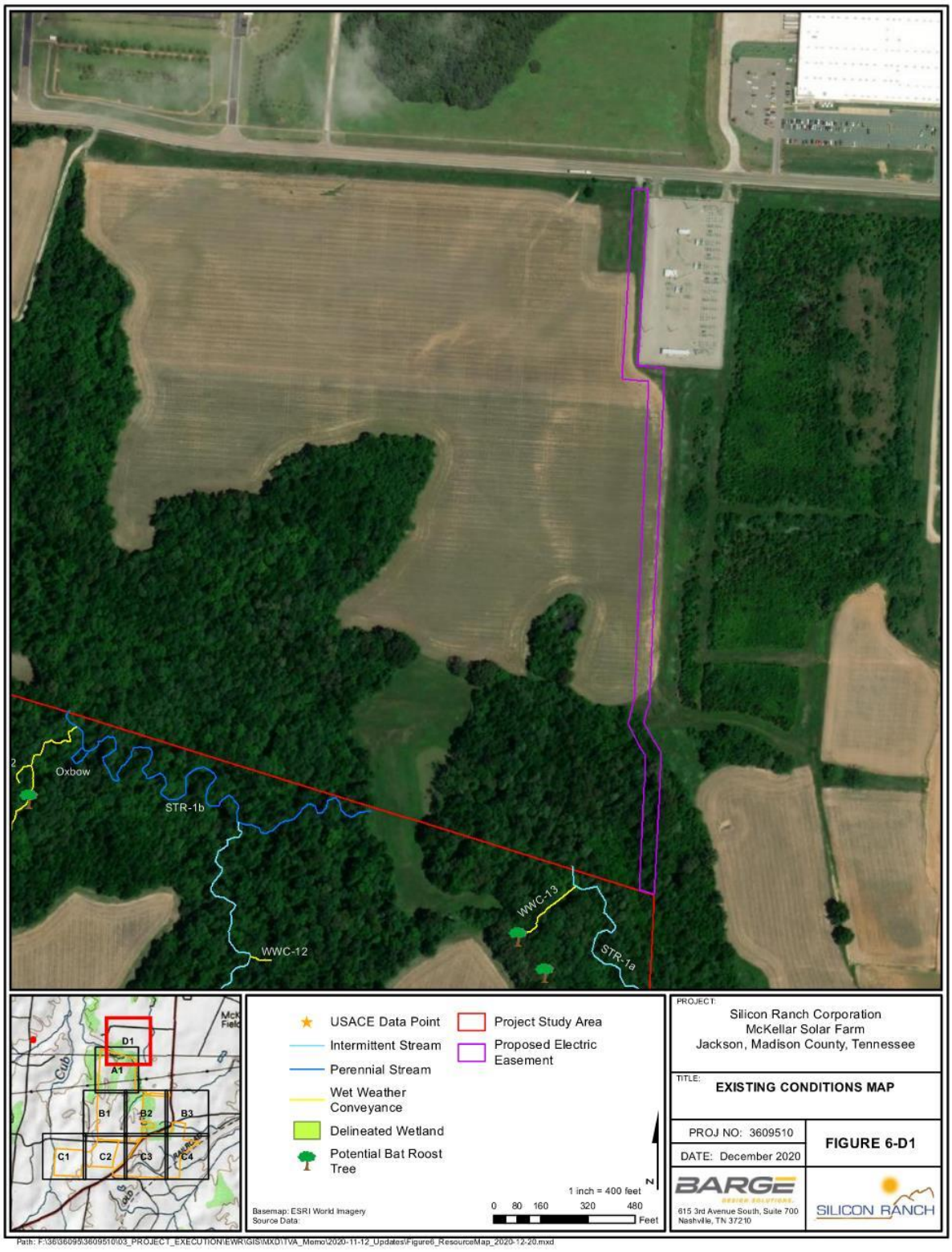

Figure 21i. Environmental Features

Figures 7a-7i summarize environmental features located within the project site. Eighteen (18) wetlands and pond features were observed within the project study area. Of which thirteen (13) of the features were observed as man-made ponds, or Palustrine Unconsolidated Bottom (PUB) feature. The remaining wetland systems were observed as either Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS) or Palustrine Forested (PFO) wetland features. Each wetland or pond feature was verified with the positive identification of suitable hydrology, hydrophytic vegetation, and hydric soils. The wetland data forms are provided in Appendix B. Each wetland is further described below.

WTL-1 was observed as a remnant isolated farm pond that was characterized as a PFO and PUB complex. The wetland was observed with primary hydrologic indicators such as, surface water of at least an inch or greater, a highwater table, a presence of water marks, water-stained leaves, aquatic fauna, and a thin muck surface. Dominant vegetation within WTL-1 includes sweetgum (*Liquidambar styraciflua*) in the tree stratum; buttonbush (*Cephalanthus occidentalis*) and trumpet creeper (*Campsis radicans*) in the shrub stratum; and poison ivy (*Toxicodendron radicans*) in the herbaceous stratum. Soils within WTL-1 were observed with a Munsell color of 10YR 3/2 surface layer and a 10YR 5/2 subsurface layer with 40-percent of redox concentrations, indicating hydric soils.

WTL-2 was observed as a remnant isolated farm pond that was characterized as a PSS and PUB complex. The wetland was observed with primary hydrologic indicators such as, surface water of at least an inch or greater, a highwater table, a presence of water marks, water-stained leaves, aquatic fauna, and a thin muck surface. Dominant vegetation within WTL-2 includes water oak (*Quercus nigra*) and black willow (*Salix nigra*) in the tree stratum; buttonbush in the shrub stratum; and trumpet creeper and muscadine grape (*Vitis rotundifolia*) in the herbaceous stratum. Soils within WTL-1 were observed with a Munsell color of 10YR 4/1 surface layer and a 10YR 6/1 subsurface layer with 30-percent of redox concentrations and 5-percent regions of depletion, indicating hydric soils.

WTL-3 was observed as a remnant isolated farm pond that was characterized as a PFO and PUB complex. The wetland was observed with primary hydrologic indicators such as, surface water of at least an inch or greater, a highwater table, a presence of water marks, water-stained leaves, aquatic fauna, and a thin muck surface. Dominant vegetation within WTL-3 includes black gum (*Nyssa sylvatica*) and slippery elm (*Ulmus rubra*) in the tree stratum; buttonbush in the shrub stratum; and swamp smartweed (*Persicaria hydropiperoides*) and clearweed (*Pilea pumila*) in the herbaceous stratum. Soils within WTL-3 were observed with a Munsell color of 10YR 3/1 surface layer and a 10YR 6/2 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-4 was observed as a remnant isolated farm pond that was characterized as a PFO and PUB complex. The wetland was observed with primary hydrologic indicators such as, surface water of at least an inch or greater, a highwater table, a presence of water marks, water-stained leaves, aquatic fauna, and a thin muck surface. Dominant vegetation within WTL-4 includes black willow in the tree stratum; buttonbush and black willow in the shrub/sapling stratum; and swamp smartweed in the herbaceous stratum. Soils within WTL-4 were observed with a Munsell color of 10YR 2/1 surface layer and a 10YR 6/1 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-5 was observed as a large man-made pond with areas of PEM fringe. In the PEM fringe portions of the wetland observed primary hydrologic indicators include, a highwater table, a presence of water marks, water-stained leaves, and aquatic fauna. Dominant vegetation within WTL-5 includes fox sedge (*Carex vulpinoidea*), soft rush (*Juncus effusus*), and buttercup (*Ranunculus acris*) in the herbaceous stratum. Soils within WTL-5 were observed with a Munsell color of 10YR 4/2 surface layer with 15-percent of redox concentrations and a 10YR 6/2 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-6 was observed as a man-made pond. Observed primary hydrologic indicators for the pond feature include surface water, a highwater table, a presence of water marks, water-stained leaves, and aquatic fauna. Dominant vegetation along the margin of WTL-6 includes sweetgum and sugarberry (*Celtis laevigata*) in the tree and sapling stratum; and woolgrass (*Scripus cyperinus*) and dark-green bullrush (*S. atrovirens*) in the herbaceous stratum. Soils within WTL-6 were observed with a Munsell color of 10YR 3/2 surface layer and a 10YR 5/1 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-7 was observed primarily as a hillside PEM wetland with little margins of PFO. Observed primary hydrologic indicators for the open meadow wetland feature include a highwater table and water-stained leaves. Dominant vegetation within WTL-7 include soft rush and reed canary grass (*Phalaris arundinacea*). Soils within WTL-7 were observed with a Munsell color of 10YR 3/2 surface layer and a 10YR 5/1 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-8 was observed as a depressional PFO wetland adjacent to an agricultural field. Observed primary indicators for the forested wetland include saturation within 4-inches of from the surface and water-stained leaves. Dominant vegetation within WTL-8 include willow oak (*Quercus phellos*) and overcup oak (*Q. lyrate*) in the tree stratum; and slippery elm, sweetgum and willow oak in the sapling stratum. Soils within WTL-8 were observed with a Munsell color of 10YR 3/2 surface layer with 10-percent of redox concentrations and a 10YR 6/1 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-9 was observed primarily as a depressional PEM wetland with a slight margin of PFO as it drains to the north. Observed primary hydrologic indicators for the open meadow wetland feature include saturation within 8-inches from the surface and water-stained leaves. Dominant vegetation within WTL-9 include fox sedge and curly doc (*Rumex crispus*) in the herbaceous stratum. Soils within WTL-9 were observed with a Munsell color of 10YR 3/2 surface layer and a 10YR 5/2 subsurface layer with 35-percent of redox concentrations, indicating hydric soils.

WTL-10 was observed in two segments, 10a was observed as mature forested PFO wetland and 10b was observed as a sapling thicket PSS wetland. Observed primary hydrologic indicators for both portions of the wetland include a high-water table, saturation within 2-inches of the surface, inundation visible on aerial imagery, water-stained leaves, and aquatic fauna. Dominant vegetation within WTL-10 include slippery elm and sweetgum in the tree stratum; hophornbeam (*Ostrya virginiana*) and slippery elm in the shrub/sapling stratum; and greenbriar (*Smilax rotundifolia*) and shallow sedge (*Carex lurida*) in the herbaceous stratum. Soils within WTL-10 were observed with a Munsell color of 10YR 3/2 surface layer and a 10YR 5/2 subsurface layer with 25-percent of redox concentrations, indicating hydric soils.

WTL-11 was observed as a man-made pond with fringes of PFO and PEM wetland. Within the PFO and PEM portions of the wetland observed primary hydrologic indicators include surface water in 3-inches in depth, a high-water table, saturation, inundation visible on aerial imagery, water-stained leaves, and aquatic fauna. Dominant vegetation observed at the PEM/PFO/PUB margin of WTL-11 include black willow in the tree stratum; black willow and buttonbush in the shrub/sapling stratum; and soft rush, dark-green bullrush and fox sedge in the herbaceous stratum. Soils were not retrievable under the surface water of the wetland.

WTL-12 was observed as a depressional PFO wetland adjacent to an agricultural field. Observed primary indicators for the forested wetland include a high-water table, saturation within 2-inches of from the surface, and water-stained leaves. Dominant vegetation within WTL-12 include black gum, willow oak and slippery elm in the tree stratum; and winterberry (*Ilex verticillata*) and slippery elm in the shrub/sapling stratum; and jewelweed (*Impatiens capensis*) and poison ivy in the herbaceous stratum. Soils within WTL-12 were observed with a Munsell color of 10YR 4/2 surface layer with 10-percent of redox concentrations and a 10YR 6/1 subsurface layer with 30-percent of redox concentrations, indicating hydric soils.

WTL-13 was observed as a man-made pond with fringes of PFO wetland and a second portion (13b) upslope of the pond that was entirely PFO wetland. Observed primary indicators for the wetland include surface water 12-inch in depth or greater, a high-water table, saturation in fringe areas, and water-stained leaves. Dominant vegetation within WTL-13 include slippery elm in the tree stratum; and black willow in the shrub/sapling stratum; and soft rush and fox sedge in the herbaceous stratum. Soils were not retrievable under the surface water of the wetland.

WTL-14 was observed as an isolated farm pond that was characterized as a PFO and PUB complex. The wetland was observed with primary hydrologic indicators such as, surface water 12-inch in depth or greater, a high-water table, saturation in fringe areas, and water-stained leaves. Dominant vegetation within the PFO fringe portion of WTL-14 includes sweetgum, river birch (*Betula nigra*) and green ash (*Fraxinus pennsylvanica*) in the tree stratum; and river birch in the shrub/sapling stratum. Soils were not retrievable under the surface water of the wetland.

WTL-15 was observed as a man-made pond with fringes of PFO wetland and a second portion (15b) downslope of the pond that was entirely PFO wetland. Observed primary indicators within the PFO portions of the wetland complex include a high-water table, saturation at the surface, water-stained leaves, hydrogen sulfide odor, presence of reduced iron, and a thin muck surface. Dominant vegetation within WTL-15 include sweetgum, slippery elm, and red maple (*Acer rubrum*) in the tree stratum; slippery elm in the shrub/sapling stratum; and jewelweed and greenbriar in the herbaceous stratum. Soils within WTL-15 were observed with a Munsell color of 10YR 3/2 mucky surface layer and a 10YR 5/2 subsurface layer with 35-percent of redox concentrations, indicating hydric soils.

WTL-16 was observed as a man-made pond. Primary hydrologic indicators for the pond feature include surface water of 12-inches or greater, a highwater table, water-stained leaves, and a thin muck surface. Dominant vegetation along the margin of WTL-16 includes slippery elm and black willow in the tree stratum; and black willow in the sapling stratum. Soils were not retrievable under the surface water of the wetland.

WTL-17 was observed as a man-made pond in a mature woodland forest. Primary hydrologic indicators for the pond feature include surface water of 12-inches or greater, a highwater table,

water-stained leaves, and a thin muck surface. Dominant vegetation along the margin of WTL-17 includes slippery elm and sweetgum in the tree and sapling stratum; and honeysuckle (*Lonicera tartarica*) and spicebush (*Lindera benzoin*) in the shrub stratum. Soils were not retrievable under the surface water of the wetland.

WTL-18 was observed as a man-made pond. Primary hydrologic indicators for the pond feature include surface water of 12-inches or greater, a highwater table, water-stained leaves, and a thin muck surface. Dominant vegetation along the margin of WTL-18 includes sweetgum and slippery elm in the tree stratum; buttonbush in the shrub stratum; and fox sedge, soft rush, and swamp smartweed in the herbaceous stratum. Soils were not retrievable under the surface water of the wetland.

Table 3: Wetland Features Delineated during McKellar Field Survey

Waterbody I.D.	Description	Location Within Project Boundaries	Estimated Amount of Aquatic Resource in Project site
WTL-1	PUB/PFO	35.583483, -88.93762	0.17 acres
WTL-2	PUB/PSS	35.578007, -88.941498	0.24 acres
WTL-3	PUB/PFO	35.580677, -88.941885	0.14 acres
WTL-4	PUB/PFO	35.584331, -88.942489	0.23 acres
WTL-5	PUB/PEM	35.573502, -88.938856	4.82 acres
WTL-6	PUB	35.581577, -88.933489	0.33 acres
WTL-7	PEM	35.580223, -88.933034	0.30 acres
WTL-8	PFO	35.573715, -88.929624	0.13 acres
WTL-9	PEM	35.573546, -88.928759	0.07 acres
WTL-10a	PFO	35.572893, -88.924407	0.77 acres
WTL-10b	PSS	35.572946, -88.922710	0.15 acres
WTL-11	PUB/PEM/PFO	35.567561, -88.937808	2.33 acres
WTL-12	PFO	35.571299, -88.931484	0.56 acres
WTL-13a	PUB	35.571336, -88.932812	0.28 acres
WTL-13b	PFO	35.571309, -88.933891	0.10 acres
WTL-14	PUB/PFO	35.568217, -88.948143	0.71 acres
WTL-15a	PUB	35.575327, -88.923528	0.75 acres
WTL-15b	PFO	35.575365, -88.923077	0.01 acres
WTL-16	PUB	35.569387, -88.930268	0.93 acres
WTL-17	PUB	35.568176, -88.952005	0.18 acres
WTL-18	PUB	35.578954, -88.935568	1.41 acres

In addition to the wetlands identified, eighteen (18) perennial and intermittent streams (STR) were delineated within the project study area. STRs-1 thru 6 and STRs-11 and 12 are all unnamed tributaries to Cub Creek and are within the South Fork Forked Deer River-Cub Creek lower

watershed. STRs-7 thru 10 and STR-14 are unnamed tributaries to Johnson Creek and its lower watershed.

STR-13 (Cub Creek) and the lower portion of STR-1(b) (unnamed tributary of Cub Creek) were determined to be perennial streams due to the presence of fish that were not mosquitofish. These streams were observed with minimal surface flow and stream beds of saturated sand and clay. The remaining delineated stream features (STRs-1a thru 12 and 14) were observed as intermittent with varying channel substrates. STR-1a and the lower portion of STR-3 were observed with a sand bottom, underlain with clay, and the remaining streams were observed with hard clay and silty-clay-loam substrates. All the intermittent streams were observed with a connection to the groundwater table through observable seepages, moderate to strong indicators of substrate sorting, and some were observed with a presence of amphibian larvae and adult frogs. Table 4 describes the streams delineated on site.

Table 4: Stream Features Delineated during McKellar Field Survey

Waterbody I.D.	Description	Location Within Project Boundaries	Estimated Amount of Aquatic Resource in Project site
STR-1a	Intermittent	Start: 35.586534, -88.934682	1,538 LF
		End: 35.589341, -88.935589	
STR-1b	Perennial	Start: 35.589804, -88.937895	2,109 LF
		End: 35.590656, -88.941362	
STR-2	Intermittent	Start: 35.578562, -88.941103	4,926 LF
		End: 35.589662, -88.939401	
STR-3	Intermittent	Start: 35.575904, -88.937756	3,984 LF
		End: 35.582792, -88.932740	
STR-4	Intermittent	Start: 35.576854, -88.93914	538 LF
		End: 35.577124, -88.937550	
STR-5	Intermittent	Start: 35.581982, -88.933229	141 LF
		End: 35.582306, -88.933225	
STR-6	Intermittent	Start: 35.582510, -88.929128	1461 LF
		End: 35.582628, -88.932726	
STR-7a	Intermittent	Start: 35.569198, -88.933163	2,891 LF
STR-7b	Intermittent	End: 35.565672, -88.926511	630 LF
STR-8	Intermittent	Start: 35.568972, -88.930254	407 LF
		End: 35.567923, -88.930265	
STR-9	Intermittent	Start: 35.571266, -88.932719	1,082 LF
		End: 35.569058, -88.932107	
STR-10	Intermittent	Start: 35.569058, -88.932107	1,004 LF
		End: 35.571266, -88.932719	
STR-11a	Intermittent	Start: 35.569660, -88.946250	425 LF
STR-11b	Intermittent	End: 35.569760, -88.953794	1,265 LF
STR-12	Intermittent	Start: 35.566078, -88.950334	1,640 LF

		End: 35.567606, -88.954010	
STR-13 (Cub Creek)	Perennial	Start: 35.568957, -88.953954	1,347 LF
		End: 35.565459, -88.954209	
STR-14	Intermittent	Start: 35.568891, -88.924463	757 LF
		End: 35.567831, -88.923249	

Forty-seven (47) wet weather conveyances (WWC) were delineated within the project study area. All WWCs were determined based on secondary indicators while conducting the HD, some of which resemble ephemeral streams and upland drainage swales. Below are brief descriptions of the delineated WWCs within the project study area. Table 5 details the location and length of the drainages.

WWCs-1 thru 28 and WWCs-42 thru 47 drain within the South Fork Forked Deer River-Cub Creek lower watershed and were observed with a likely surface water connection to a delineated perennial or intermittent stream within the project study area. WWCs-29 thru 41 drain within the Johnson Creek lower watershed and were also observed with likely surface water connections with delineated stream features.

Thirty-six (36) of the 47 WWCs can be considered as ephemeral streams. These ephemeral channels were observed with a presence of a bed and bank, an ordinary highwater mark (OHWM) and some sorting of soil textures. Nearly all the delineated ephemeral channels were observed with small to medium sized headcuts and a bottom of silty-clayey substrate with little to no vegetation in the thalweg.

The remaining 11 WWCs were considered as upland drainage swales. These drainages were observed with a lack of an OHWM and somewhat of a presence of a bed and bank. These features also lacked substrate sorting and at times contained a high presence of vegetation in the thalweg with high densities of fibrous roots in the channel. Some channels, such as WWC-44, resembled relic channels of potential stream features that have been historically altered to create a farm pond or catch basin (WWC-46). Table 5 describes the WWCs delineated on-site.

Table 5: Wet Weather Conveyances Delineated during McKellar Field Survey

Waterbody I.D.	Description	Location Within Project Boundaries	Estimated Amount of Aquatic Resource in Project site
WWC-1	Wet Weather Conveyance / Ephemeral Stream	Start: 35.587388, -88.942571	1,523 LF
		End: 35.590504, -88.941280	
WWC-2	Wet Weather Conveyance / Ephemeral Stream	Start: 35.589969, -88.941915	90 LF
		End: 35.590135, -88.941785	
WWC-3	Wet Weather Conveyance / Drainage Swale	Start: 35.585932, -88.943489	91 LF
		End: 35.585892, -88.943761	

WWC-4	Wet Weather Conveyance / Ephemeral Stream	Start: 35.584171, -88.942627 End: 35.584011, -88.943244	227 LF
WWC-5	Wet Weather Conveyance / Ephemeral Stream	Start: 35.582112, -88.942602 End: 35.583487, -88.943785	683 LF
WWC-6	Wet Weather Conveyance / Drainage Swale	Start: 35.580866, -88.941912 End: 35.581130, -88.941317	210 LF
WWC-7	Wet Weather Conveyance / Ephemeral Stream	Start: 35.582167, -88.939636 End: 35.582516, -88.940156	223 LF
WWC-8	Wet Weather Conveyance / Ephemeral Stream	Start: 35.582628, -88.939212 End: 35.583117, -88.939953	343 LF
WWC-9	Wet Weather Conveyance / Ephemeral Stream	Start: 35.583579, -88.94038 End: 35.583674, -88.940054	127 LF
WWC-10	Wet Weather Conveyance / Ephemeral Stream	Start: 35.585695, -88.940607 End: 35.586550, -88.939519	536 LF
WWC-11	Wet Weather Conveyance / Ephemeral Stream	Start: 35.588074, -88.939844 End: 35.587965, -88.939607	84 LF
WWC-12	Wet Weather Conveyance / Drainage Swale	Start: 35.588389, -88.938984 End: 35.588414, -88.939218	73 LF
WWC-13	Wet Weather Conveyance / Drainage Swale	Start: 35.588708, -88.936154 End: 35.589162, -88.935526	266 LF
WWC-14	Wet Weather Conveyance / Ephemeral Stream	Start: 35.587129, -88.936162 End: 35.587645, -88.934679	538 LF
WWC-15	Wet Weather Conveyance / Ephemeral Stream	Start: 35.585038, -88.937778 End: 35.586823, -88.934870	1,252 LF
WWC-16		Start: 35.586450, -88.936987	166 LF

	Wet Weather Conveyance / Drainage Swale	End: 35.586164, -88.936572	
WWC-17	Wet Weather Conveyance / Ephemeral Stream	Start: 35.583269, -88.935269 End: 35.583226, -88.934747	192 LF
WWC-18	Wet Weather Conveyance / Ephemeral Stream	Start: 35.583246, -88.936602 End: 35.582821, -88.934693	690 LF
WWC-19	Wet Weather Conveyance / Ephemeral Stream	Start: 35.582562, -88.935677 End: 35.582758, -88.935621	86 LF
WWC-20	Wet Weather Conveyance / Ephemeral Stream	Start: 35.581468, -88.931855 End: 35.582222, -88.932339	430 LF
WWC-21	Wet Weather Conveyance / Ephemeral Stream	Start: 35.580611, -88.937583 End: 35.580371, -88.935379	810 LF
WWC-22	Wet Weather Conveyance / Ephemeral Stream	Start: 35.579171, -88.935602 End: 35.579729, -88.935773	229 LF
WWC-23	Wet Weather Conveyance / Drainage Swale	Start: 35.577932, -88.937162 End: 35.577996, -88.937002	61 LF
WWC-24	Wet Weather Conveyance / Drainage Swale	Start: 35.577765, -88.936904 End: 35.577899, -88.937011	62 LF
WWC-25	Wet Weather Conveyance / Ephemeral Stream	Start: 35.576147, -88.936769 End: 35.576613, -88.937709	385 LF
WWC-26	Wet Weather Conveyance / Ephemeral Stream	Start: 35.575855, -88.937317 End: 35.575897, -88.937751	154 LF
WWC-27	Wet Weather Conveyance / Ephemeral Stream	Start: 35.575828, -88.937341 End: 35.575904, -88.937756	136 LF
WWC-28		Start: 35.576618, -88.939543	153 LF

	Wet Weather Conveyance / Ephemeral Stream	End: 35.576854, -88.93914	
WWC-29	Wet Weather Conveyance / Ephemeral Stream	Start: 35.573684, -88.928672 End: 35.57666, -88.92499	1,047 LF
WWC-30	Wet Weather Conveyance / Drainage Swale	Start: 35.568716, -88.946061 End: 35.569011, -88.945999	305 LF
WWC-31	Wet Weather Conveyance / Ephemeral Stream	Start: 35.572558, -88.920780 End: 35.572349, -88.919986	272 LF
WWC-32	Wet Weather Conveyance / Ephemeral Stream	Start: 35.572929, -88.919547 End: 35.572379, -88.920053	343 LF
WWC-33	Wet Weather Conveyance / Ephemeral Stream	Start: 35.572409, -88.920971 End: 35.572423, -88.920549	153 LF
WWC-34	Wet Weather Conveyance / Ephemeral Stream	Start: 35.570200, -88.925107 End: 35.569010, -88.924585	539 LF
WWC-35	Wet Weather Conveyance / Ephemeral Stream	Start: 35.569582, -88.924234 End: 35.569231, -88.924573	172 LF
WWC-36	Wet Weather Conveyance / Drainage Swale	Start:35.566924, -88.928111 End: 35.566671, -88.928083	98 LF
WWC-37	Wet Weather Conveyance / Ephemeral Stream	Start: 35.567009, -88.928544 End: 35.566841, -88.928596	69 LF
WWC-38	Wet Weather Conveyance / Ephemeral Stream	Start: 35.568981, -88.929969 End: 35.568842, -88.930276	105 LF
WWC-39	Wet Weather Conveyance / Ephemeral Stream	Start: 35.567241, -88.936162 End: 35.569198, -88.933163	928 LF
WWC-40		Start: 35.569429, -88.935412	467 LF

	Wet Weather Conveyance / Ephemeral Stream	End: 35.568654, -88.934225	
WWC-41	Wet Weather Conveyance / Ephemeral Stream	Start: 35.571343, -88.933593 End: 35.571404, -88.933361	76 LF
WWC-42	Wet Weather Conveyance / Ephemeral Stream	Start: 35.570202, -88.945179 End: 35.570442, -88.94578	237 LF
WWC-43	Wet Weather Conveyance / Drainage Swale	Start: 35.569999, -88.946070 End: 35.570157, -88.946163	64 LF
WWC-44	Wet Weather Conveyance / Drainage Swale	Start: 35.569392, -88.948632 End: 35.570767, -88.949218	637 LF
WWC-45	Wet Weather Conveyance / Ephemeral Stream	Start: 35.570099, -88.950035 End: 35.570641, -88.950594	284 LF

3.3.1.3 Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a 1-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988, Floodplain Management. A map showing the project site and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) is presented in Figure 8a and 8b (FEMA 2020).

Based on a review of Panel 260 of 435, Map No. 47113C060E of the Madison County, Tennessee, Flood Insurance Rate Map (FIRM), and Panel 255 of 435, Map No. 47113C0255E of the Madison County, Tennessee, FIRM, both effective 8/3/2009, portions of the project site would be located within the floodplains of unnamed tributaries of Cub Creek and Johnson Creek.

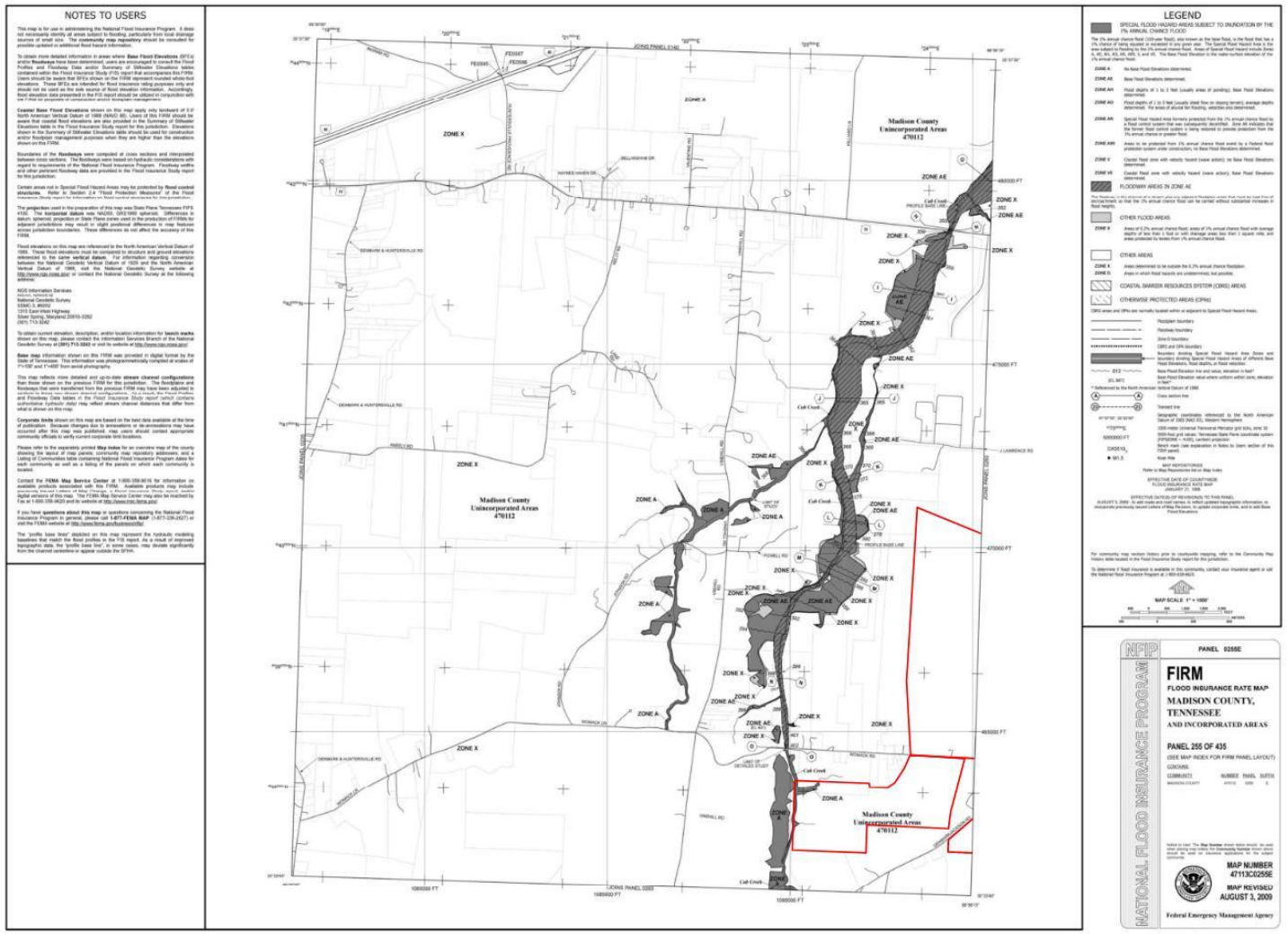

Figure 23a. Site boundary and FEMA floodplain

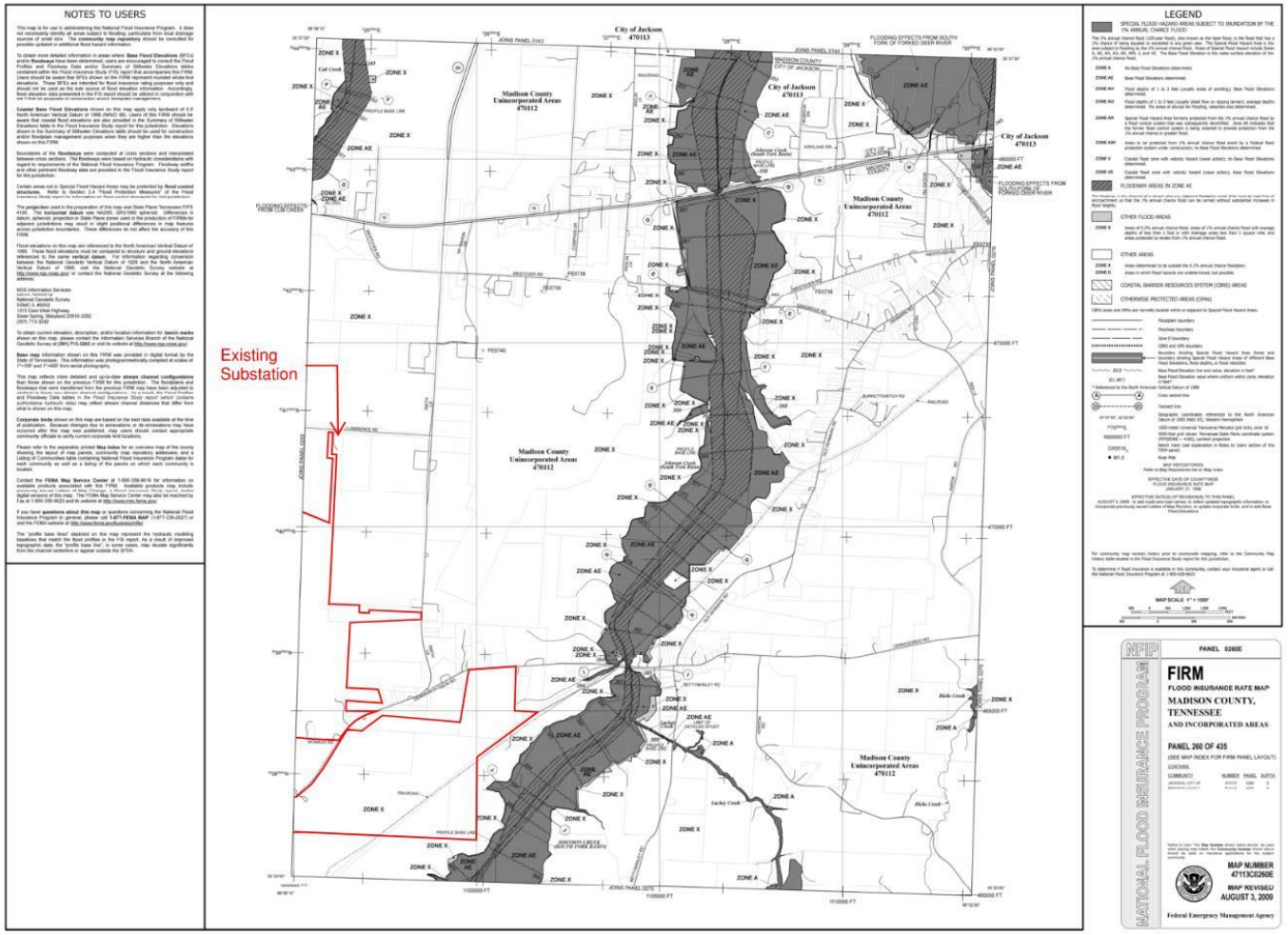

Figure 25b. Site boundary and FEMA floodplain

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed and no project-related impacts to water resources would occur. Existing land use would remain as farmland, and surface waters would remain as they were observed. Increases in erosion and sediment runoff could occur over time if best-practices in agriculture were not maintained to prevent erosion and runoff. In addition, if broad applications of chemical fertilizers or pesticides are continually used, it could result in nutrient-rich runoff that degrades the quality of surface waters within the site and throughout the drainage basin.

3.3.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, minor, impacts from construction would be expected on streams, wetlands, and floodplains. Beneficial, indirect impacts to surface water and groundwater would result from a reduction in broad application of pesticides, herbicides, and fertilizers used in support of the current agricultural land use activities.

Groundwater

Direct adverse impacts to the supply and availability of groundwater are not anticipated with implementation of the Proposed Action Alternative. During construction, hazardous materials would be on-site that could potentially contaminate groundwater resources, including petroleum products for fuel and lubrication of construction equipment, hydraulic fluids, and a variety of other chemicals commonly used for general construction projects. A Spill Prevention, Control, and Countermeasure (SPCC) Plan would minimize the potential for leaks or spills from construction equipment and outline procedures and protocols to quickly address potential spills that may occur. Pollution to groundwater from sedimentation could occur during construction activities resulting from erosion. Appropriate BMPs would be followed, and all proposed project activities would be conducted in a manner to ensure waste materials are contained and the introduction of pollution materials to the receiving waters would be minimized. A general construction stormwater permit would be needed as more than one (1) acre would be disturbed. This permit also requires the development and implementation of a SWPPP.

Because this project is within the watershed of impaired waters, an average 60-foot buffer is shown around aquatic features on-site (TDEC 2020). Under the Proposed Action Alternative, as part of the SR McKellar land purchase agreement, approximately 60-70 percent of the trees on-site would be harvested. Following purchase of the property, SR McKellar would clear the majority of the remaining trees within approximately 209 acres of the project site to accommodate the proposed solar facility and reduce shading on the panels. Overall, approximately 304 acres of the existing 355 acres would be cleared. Non-mechanical tree clearing would occur within stream and wetland buffers and wetlands on-site. In the buffer areas where tree clearing is proposed, the stumps would be left in place to minimize ground disturbance. Further, minor direct stream impacts are required to accommodate the proposed access roads. The SWPPP would identify specific BMPs to address construction-related activities that would be adopted to minimize stormwater and groundwater impacts. Additionally, BMPs, as described in the Tennessee Erosion and Sediment Control Handbook (TDEC 2012), would be used to avoid contamination of surface water in the project site.

Additionally, impervious buildings and infrastructure prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams.

Clearing of vegetation and ground cover, and the addition of impervious surfaces, could alter the current stormwater flows. The Proposed Alternative Action could increase the impervious cover on the project site, thus altering and possibly increasing the concentrated stormwater flow off the project site. This flow would be properly treated by implementing proper BMPs or diverting the stormwater discharge to ensure proper drainage. The proposed substation modifications would be within the existing substation footprint, so no impacts to groundwater are anticipated from the modifications.

During construction, portable toilets would be provided for the construction workforce as needed. These toilets would be pumped out regularly, and the sewage would be transported by tanker truck to a publicly-owned wastewater treatment works that accepts pump out. Equipment washing and dust control discharges would be handled in accordance with BMPs described in the SWPPP for water-only cleaning. Proper implementation of these and other controls are expected to result in only minor, temporary impacts to surface waters.

If the facility were to be decommissioned or closed, a Decommissioning and Closure Plan would be developed. The Decommissioning and Closure Plan would detail procedures to control erosion and sedimentation to maintain compliance with NPDES requirements and permits. Water usage for potential decommissioning and closure is not likely to exceed that used for operation and maintenance. Therefore, impacts to groundwater resulting from a decommissioning and closure of the facility are not anticipated.

Overall, impacts to local aquifers and groundwater are not anticipated due to the limited volume of groundwater required for initial construction, operation, and maintenance, or decommissioning and closure. Implementation of BMPs and a Decommissioning and Closure Plan would reduce the potential for hazardous materials to reach groundwater resources throughout construction and operations of the facility.

Additionally, minor, indirect beneficial impacts to groundwater could occur from the discontinued use of broad applications of herbicides, pesticides, and fertilizers, due to change in land use from agriculture to solar.

Surface Water

TVA is subject to Executive Order (EO) 11990, Protection for Wetlands, which mandates federal agencies avoid new construction in wetlands wherever practicable and otherwise minimize wetland destruction or degradation. In alignment with the goals of EO 11990, no permanent structures associated with the solar facility are proposed within wetlands on-site under the Proposed Action Alternative.

Timber harvesting and tree removal are proposed within wetlands. As part of the SR McKellar land purchase agreement, approximately 60-70 percent of the trees on-site would be harvested. Following purchase of the property, SR McKellar would clear remaining trees to reduce shading on solar panels. As a result, a total of 3.28 acres PFO and PSS wetlands identified with tall saplings would be converted from forested/scrub-shrub to meadow habitat. PEM and PUB wetlands would be maintained as such. Tree clearing in wetlands would be performed using non-mechanical methods, and the stumps would be left in place to avoid ground and soil disturbance. Vegetation would be maintained throughout the 15-year PPA to avoid shading impacts to the panels. Table 6 further describes the anticipated wetland impacts resulting from the proposed tree clearing.

Table 6. Wetland Tree Clearing Impacts

Waterbody I.D.	Description	Approximate Aquatic Resource in Project Site (Acres)	Approximate Tree Removal in Wetland (Acres)	Impact Type
WTL-1	PUB	0.08	-	Maintain
	PFO	0.09	0.09	Conversion
WTL-2	PUB	0.06	-	Maintain
	PSS	0.18	0.18	Conversion
WTL-3	PUB	0.03	-	Maintain
	PFO	0.11	0.11	Conversion
WTL-4	PUB	0.16	-	Maintain
	PFO	0.07	0.07	Conversion
WTL-5	PUB	4.62	-	Maintain
	PEM	0.20	-	Maintain
WTL-6	PUB	0.33	-	Maintain
WTL-7	PEM	0.21	-	Maintain
	PFO	0.09	0.04	Conversion
WTL-8	PFO	0.13	0.09	Conversion
WTL-9	PEM	0.06	-	Maintain
	PFO	0.01	0.01	Maintain
WTL-10a	PFO	0.77	0.75	Conversion
WTL-10b	PSS	0.15	0.15	Conversion
WTL-11	PUB	1.14	-	Maintain
	PFO	0.99	0.69	Conversion
	PEM	0.20	-	Maintain
WTL-12	PFO	0.56	0.49	Conversion
WTL-13a	PUB	0.28	-	Maintain
WTL-13b	PFO	0.10	0.07	Conversion
WTL-14	PUB	0.36	-	Maintain
	PFO	0.35	0.35	Conversion
WTL-15a	PUB	0.49	-	Maintain
	PFO	0.26	0.18	Conversion
WTL-15b	PFO	0.01	0.01	Conversion
WTL-16	PUB	0.93	-	Maintain
WTL-17	PUB	0.18	-	Maintain
WTL-18	PUB	1.41	-	Maintain
Total Converted Wetland Area (Acres)			**3.28**	-

Due to the rate of water uptake, extensive root system, and structural integrity of trees and saplings relative to herbaceous plants, wooded wetlands function at a greater capacity to

impede and hold storm water, absorb toxins, and retain sediment. Therefore, wooded wetland conversion to emergent habitat results in reduced wetland function. However, tree clearing under the proposed Action Alternative would be conducted in accordance with local, state, and federal wetland mandates and best management practices for forestry operations, which ensure no more than minimal impacts to the aquatic environment.

Based on the preliminary site layout, four (4) minor direct impacts to stream channels would be required for the proposed access roads through the property. These impacts would be subject to the terms and conditions of a general ARAP from TDEC pursuant to Section 401 of the CWA, and a USACE NWP pursuant to Section 404 of the CWA (33 U.S.C. § 1251 et seq.). A Hydrologic Determination from TDEC and Jurisdictional Determination from the USACE was previously issued. Based on the Proposed Action Alternative, individual permitting efforts would not be needed. With implementation of appropriate BMPs, impacts to surface waters and aquatic life would be insignificant during construction and no long-term adverse impacts are anticipated. There is a potential for long-term beneficial impacts on streams within the project site due to the reduction in annual agriculture activities and applications of pesticides and fertilizer within the project site.

Construction and maintenance of the gentie would not result in impact to jurisdictional wetlands or streams. Since the TVA substation modifications would occur within the footprint of the previously developed substation, no impacts to water resources would occur as a result of the modifications.

There would be numerous WWCs within the proposed site layout that could be impacted during construction and operation of the facility. These WWCs would be included and accounted for in the SWPPP submittal as part of the NPDES permit.

Floodplains

TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council, 1978). The EO requires that agencies avoid activities in the 100-year floodplain unless there is no practicable alternative.

Approximately three (3) acres of the southwestern-most parcel is located within the approximate 1-percent-annual-chance floodplain of Cub Creek. As shown in Figure 2, although minimal grading (outside of the designated floodplain) would be necessary to construct and install the solar facility, none of the proposed solar facilities, gentie line, substation upgrades, and access roads would be constructed within either the 1-percent-annual-chance or unmapped floodplains; therefore, there would be no direct impacts to the floodplain. This would be consistent with EO 11988, and therefore, the project would result in no significant impacts on the natural and beneficial values of floodplains.

3.4 BIOLOGICAL RESOURCES

This section provides an overview of existing biological resources within the McKellar project site and potential impacts to biological resources that would be associated with the Proposed Action Alternative and No Action Alternative.

3.4.1 Affected Environment

The existing biological resources reviewed include vegetation, wildlife, and rare, threatened, or endangered species.

A desktop survey was performed prior to field investigations of the proposed project site. Wildlife, vegetation, and threatened and endangered (T&E) species were researched during the desktop survey and verified through field investigations in May 2020. Results of desktop survey, field investigations, and list updates are described in this section. Photos taken during the field investigation are included in the appendices.

Biological resources are regulated by a number of federal and state laws. The laws and rules relevant to the Proposed Alternative Action undertaken by SR McKellar include:

- The Endangered Species Act (16 U.S.C. §§ 1531-1544);
- The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. §§ 703-712) (for actions of nonfederal entities);
- The Executive Order for Migratory Birds (EO 13186 of January 10, 2001) (for actions of federal agencies); and
- Rules of the Tennessee Wildlife Resources Agency, Chapter 1660-01-32 (based on authority provided in Tennessee Code Annotated §§ 70-1-206, 70-8-104, 70-8-106 and 70-8-107).

3.4.1.1 Vegetation

The project site is largely utilized for agriculture and was observed to be planted with cotton and corn during the site investigations. Besides cotton and corn, some grasses and weedy vegetation were observed growing along the margins of the cropland. Additionally, there were two locations of maintained residential lawns. These grasses and weedy vegetation include foxtail grass (*Setaria pumila*), orchard grass (*Dactylis glomerata*), perennial ryegrass (*Lolium perenne*), rough cocklebur (*Xanthium strumarium*), morning glory (*Ipomoea purpurea*), red fescue (*Festuca rubra*), and common milkweed (*Asclepias syriaca*).

Fragmented deciduous forest was also observed in the drainage valleys and rolling hillsides of the project site, adjacent to the leveled agricultural fields. This forest community ranges from early successional to second growth mixed hardwood forest. Dominant canopy species in the this portion of the project site includes white ash (*Fraxinus americana*), southern red oak (*Quercus falcata*), bur oak (*Quercus macrocarpa*), slippery elm (*Ulmus rubra*), hackberry (*Celtis occidentalis*), eastern red cedar (*Juniperus virginiana*), tulip-poplar (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), sweet gum (*Liquidambar styraciflua*), black cherry (*Prunus serotina*), shagbark hickory (*Carya ovata*) and willow oak (*Quercus phellos*). Honeysuckle (*Lonicera tartarica*), privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*) are common in the shrub layer with poison ivy (*Toxicodendron radicans*), Japanese honeysuckle (Lonicera japonica), jumpseed (*Polygonum virginianum*), Virginia creeper (*Parthenocissus quinquefolia*) and woodoats (*Chasmanthium latifolium*) in the herbaceous stratum.

3.4.1.2 Wildlife

While most of the project site is active cropland, wildlife was observed. Identified wildlife were observed utilizing the fragmented forested portions of the site, the inspected wetland and stream ditches, the residential areas and surrounding industrial environments. Table 7 details some of the observed wildlife during the field investigations. This list is a preliminary species presence list for the project site.

Table 7. Observed Wildlife within the Project Site

Common Name	Scientific Name
Birds	
American robin	*Turdus migratorius*
Carolina chickadee	*Poecile carolinensis*
Blue jay	*Cyanocitta cristata*
Broad-winged hawk	*Buteo platypterus*
Cooper's hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hyemalis*
European starling	*Sturnus vulgaris*
Field sparrow	*Spizella pusilla*
Great blue heron	*Ardea herodias*
House finch	*Haemorhous mexicanus*
Killdeer	*Charadrius vociferus*
Red-winged black-bird	*Agelaius phoeniceus*
Eastern towhee	*Pipilo erythrophthalmus*
Northern cardinal	*Cardinalis cardinalis*
Northern mockingbird	*Mimus polyglottos*
Red-bellied woodpecker	*Melanerpes carolinus*
Tufted titmouse	*Baeolophus bicolor*
Red tailed hawk	*Buteo jamaicensis*
Wood thrush	*Hylocichla mustelina*

Common Name	Scientific Name
Mammals	
Eastern chipmunk	*Tamias striatus*
Eastern gray squirrel	*Sciurus carolinensis*
White-tailed deer	*Odocoileus virginianus*
Racoon	*Procyonidae lotor*
Opossum	*Didelphis virginiana*
Coyote	*Canis latrans*
Reptiles	
Eastern black kingsnake	*Lampropeltis nigra*
Ground skink	*Scincella lateralis*
Amphibians	
Green frog	*Lithobates clamitans*
American toad	*Anaxyrus americanus*
Gray treefrog	*Hyla versicolor*
Fish	
Green sunfish	*Lepomis cyanellus*
Minnow spp.	--
Invertebrates	
Viceroy	*Limenitis archippus*
Monarch	*Danaus plexippus*

Migratory Birds

The USFWS Information for Planning and Conservation (IPaC) Trust Resource website was evaluated for migratory bird species that may be present within the project site and is included in the appendices.

The USFWS IPaC report identified two species of migratory birds of concern that have the potential to occur in the vicinity of the project site: the wood thrush (*Hylocichla mustelina*) and the American kestrel (*Falco sparverius paulus*). These are birds of conservation concern, which are species not already federally listed, that represent the USFWS highest conservation priorities. The IPaC report indicates the wood thrush breeds May through August with highest probability of occurrence in the project site during the month of July (USFWS 2020b). The forested areas surrounding the project site presents potential habitat for the wood thrush (Cornell University 2020b). The American kestrel has a breeding season from April to August with heightened probability of presence in the project site during January, April, and May (USFWS 2020b). The open-field habitat present throughout much of the project site may provide resources for the American kestrel (Cornell University 2020a). Note, the wood thrush was identified on site during field investigations (Table 6).

3.4.1.3 Threatened and Endangered (T&E) and Other Rare Species

TVA provided a preliminary heritage database query for the project study area and within the surrounding area, the county, and watersheds. Table 8 details some of the potentially present

federal and state protected species for the area from the TVA heritage database query. No state or federally listed species were observed during the May 2020 site inspection; however the monarch butterfly, a recent candidate for listing under the Endangered Species Act, was observed flying over the study area.

The USFWS IPaC Trust Resource website was evaluated for potential threatened and endangered species that may be present within the project site. An official list of threatened and endangered species that may potentially be affected by activities performed at this location can be found in the appendices.

Table 8. Protected Species Potentially within the Project Site

Common Name	Species	Federal Status	State Status	State Rank	Habitat Present (Y/N)
Mammals					
Indiana Bat	*Myotis sodalis*	Endangered	Endangered	S1	Y (Roost)
Northern Long Eared Bat	*Myotis septrionalis*	Endangered	Endangered	S1S2	Y (Roost)
Invertebrates					
Monarch Butterfly	*Danaus plexippus*	Candidate Species	N/A	N/A	Y
Fish					
Firebelly Darter	*Etheostoma pyrrhogaster*	No federal status	Need of Management	S2	N
Northern Madtom	*Noturus stigmosus*	No federal status	Need of Management	S3	N
Naked Sand Darter	*Ammocrypta beani*	No federal status	Need of Management	S2	N
Plants					
Whorled Sunflower	*Helianthus verticillatus*	Endangered	Endangered	S1	Not Likely Present

State Rank Abbreviations

S1 - Extremely rare and critically imperiled in the state with five or fewer occurrences, or very few remaining individuals, or because of some special condition where the species is particularly vulnerable to extinction

S2 - Very rare and imperiled within the state, six to twenty occurrences, or few remaining individuals, or because of some factor(s) making it vulnerable to extinction

S3 - Rare and uncommon in the state, from 21-100 occurrences

Perennial streams were encountered within the project study area, Cub Creek (STR-13) and STR-1b. However, they were observed with little to no surface water above the saturated sandy channel bottom, not preferred by the listed fish species above. Therefore, the state listed fish species for the project site are not anticipated to be impacted with the development of the solar facility.

TVA provided a heritage database query for the project site. The search criteria included aquatics (within a 10-mile radius of the project site, county, and HUC), botany (within a five (5) mile radius of the project site and the county), natural areas (within a five (5) mile radius of the project site) and terrestrial zoology (within a three (3) mile radius project site and county). The records indicated the federally listed plant species, the whorled sunflower (*Helianthus verticillatus*), has been previously reported from Madison County, Tennessee. No state listed plants within five (5) mile radius of the project site were identified in the database query. The USFWS IPaC search also indicated that the federally listed plant species, the whorled sunflower, could be present on-site.

The whorled sunflower is listed as endangered in both the state of Tennessee and federally. It has previously been reported within Madison County, Tennessee. The whorled sunflower occurs in moist, prairie-like openings in woodlands and along adjacent creeks. The plant grows in sandy

clay soils which are alkaline, high in organic matter, and seasonally wet. In TN, the species primarily occurs within the margins of agricultural fields and roadsides. They are known to occur in areas of Falaya silt loam soils. There is critical habitat for the whorled sunflower population in Madison County; however, it is located near Pinson, about 14 miles southeast of the project site (USFWS 2020a).

An August 31 field survey for the state endangered and federally endangered whorled sunflower was performed within the 942-acre project site. Survey efforts were focused on the margins of existing agricultural fields and roadways within the project site. These areas included portions of fallow fields, a historic railroad bed in the southern properties, existing utility right-of-ways, farm pond fringes, and edges of farm access roads. Furthermore, approximately 0.10-percent of the project study area contains Falaya silt loam (Fa) soils (located in the southeastern portion of the property, adjacent to Denmark-Jackson Road). This portion of the site was thoroughly surveyed for the whorled sunflower. No whorled sunflower specimens were observed within or immediately adjacent to the project site. The report is enclosed within Appendix C.

The monarch butterfly (*Danaus plexippus)* was recently listed as a Candidate species under ESA and was identified on-site during field surveys. They live in a variety of habitats throughout North America and various locations across the globe. In North America, the eastern population (east of the Rocky Mountains) migrate north to the United States and Canada in March. The fall migration back to overwintering sites in Mexico from August to November. They require milkweed for breeding and use a variety of flowering plants throughout migration and breeding (USFWS 2020f). A monarch was observed flying over an open field portion of the project site. Little milkweed was observed along the field margins, but no eggs or caterpillars were observed.

Based on the results of the IPaC query, two species of federally listed bats potentially occur on the project site: the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*Myotis septentrionalis*). No records of either species are known from Madison County, Tennessee. Both bats prefer winter habitats (hibernacula) that include caves, mines, and cave-like structures (NatureServe 2020; USFWS 2015, 2020c, 2020d). Both species also utilize areas near caves in the fall and spring (for swarming and staging) prior to migration back to their summer habitat (roosting habitat) (NatureServe 2020). During the summer, Indiana bats roost under the exfoliating bark of dead and living trees in mature forests with an open understory often near sources of water. Indiana bats are known to change roost trees frequently throughout the season, yet still maintain site fidelity, returning to the same summer roosting areas in subsequent years. This species forages over forest canopies, along forest perimeters, tree lines, and occasionally over bodies of water (Kurta et al. 2002; USFWS 2020).

In the summer, northern long-eared bats roost individually or in colonies beneath exfoliating bark or in crevices of both live and dead trees. While roost selection is similar to Indiana bats, northern long-eared bats are more opportunistic in roost site selection. This species has also been documented roosting in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2020c).

The survey for potential suitable roosting habitat was preformed concurrently with the surface water delineation, between May 11th and May 14th and May 28th and May 29th, following USFWS March 2020 federal guidelines (USFWS 2020e). Potential roosting habitat was identified as trees larger than three (3) inches in diameter at breast height and that contained loose or shaggy bark or crevices suitable for use. Potentially suitable summer roosting habitat for both species was

identified in the project site. Of the approximately 355 acres of wooded area on-site, approximately 71.10 acres was identified as good quality habitat, 104.99 acres was identified as marginal quality habitat, and 178.48 acres was identified as poor-quality habitat. A map depicting the various areas of habitat within the project site is enclosed within Appendix H. A total of 27 potential bat roost trees were observed and documented within the fragmented wooded portions of the project site (See Figures 7a-7i). No caves or mines are located in the project site or immediately adjacent properties. No man-made structures that could offer potential roosting habitat were identified on site. Foraging habitat for both species exists throughout the project site. The riparian areas, mature woodlands, farm pond wetlands, and field margins provide adequate foraging opportunities for both of these bat species.

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed and no project-related impacts to vegetation, wildlife, and/or rare, threatened or endangered species would occur. It is assumed that active farming within the project site would continue if the solar facility was not constructed. Further impacts to wildlife would continue as under the existing land use. Lastly, no direct or indirect impacts to threatened or endangered or other rare species are anticipated.

3.4.2.2 Proposed Action Alternative

Vegetation

Under the Proposed Action Alternative, approximately 304-acres of wooded area would be cleared. As part of the SR McKellar land purchasing agreement, 60-70 percent of the trees would be harvested. Following purchase of the property, SR McKellar would clear the majority of the remaining trees within approximately 209 acres of the project site to accommodate the proposed solar facility and reduce shading on panels. A map depicting the proposed tree clearing is provided in Appendix H. In addition, approximately 223 acres of cropland would be disturbed for the proposed solar facility.

Taking into consideration the large amount of similar vegetation types in the area both regionally and locally, clearing the existing vegetation, removal of cropland, and light grading would be considered minimal and insignificant impacts. The surrounding area consists of similar vegetation communities, and the effects of the conversion of agricultural and open land would be relatively small. Direct impacts to forested land would be minimal as most of the trees species on the project site are located adjacent to the site locally and regionally. Following construction, the solar facility will be maintained to prevent vegetation from growing above the panel height, converting the vegetation from maintained agricultural practices. No adverse impact to unique vegetation communities is anticipated. Effects would be further reduced as revegetation of the site would be accomplished using native and/or noninvasive species. Disturbed areas would be seeded post-construction using a mixture of certified weed-free, low-growing native grass seed obtained from a reputable seed dealer and in compliance with the requirements established by the local office of the NRCS. Flowering seed mix will be placed in designated disturbed areas, which may provide more flowering plants than previously occurred on-site. The Proposed Action Alternative would not significantly contribute to the spread of exotic or invasive species.

BMPs and appropriate erosion controls would be used as needed to minimize exposure of soil and erosion of soil from the project site. Silt fences, sedimentation basins, and other appropriate

controls would be used, as needed, to minimize exposure of soil and to prevent eroded soil from leaving the work area. Disturbed areas would be seeded post-construction using a mixture of certified weed-free, low-growing native grass seed obtained from a reputable seed dealer and in compliance with the requirements established by the local office of the NRCS. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has become well-established and stabilized.

Note that as the proposed TVA substation upgrades would occur within the footprint of the existing substation, no impact to vegetation is anticipated from the modifications.

Wildlife

Wildlife present at the time of construction would be impacted, particularly during use of heavy machinery for vegetation clearing and driving piles. This would result in the displacement of any wildlife (primarily common, habituated species) currently using the area. Direct effects to some individuals may occur if those individuals are immobile during the time of habitat removal. This would be more likely to occur if activities took place during breeding/nesting seasons or winter hibernation periods when animals are immobile in shallow borrows. Habitat removal likely would disperse mobile wildlife into surrounding areas in an attempt to find new food sources, shelter sources and to reestablish territories. Those animals able to use early successional habitats could return to the site upon completion of the project. Due to the amount of similarly suitable habitat in areas immediately adjacent to the project site, populations of common wildlife species likely would not be impacted by the proposed actions.

Two migratory birds of conservation concern identified by the USFWS may be impacted by the proposed action, wood thrush and American kestrel. Wood thrush was identified in the project site during field surveys. Vegetation removal is proposed when both of these species could be on site at the end of their breeding seasons when second broods may be reared. Direct effects could occur to these nestlings in proposed areas of tree removal. Mobile individuals are expected to flush if disturbed (this includes adults and fledglings hatched from the first brood of the year). Due to the timing of the proposed vegetation removal (late summer- March) and the relative abundance of similarly suitable habitat nearby, it is not expected that populations of these migratory bird species would impacted.

Overall, direct impacts to wildlife would be minor and insignificant. These impacts would be temporary during construction, and wildlife populations may be able to disperse to undeveloped habitat within the project site. Upon completion of the project the site will be revegetated using a mixture of certified weed-free, low-growing native grass seed obtained from a reputable seed dealer and in compliance with the requirements established by the local office of the NRCS. Flowering seed mix will also be placed in designated disturbed areas, which may provide more flowering plants than previously occurred on-site. Wildlife able to use this type of habitat are expected to return to the site upon completion of proposed actions.

Threatened and Endangered (T&E) and Other Rare Species

Under the Proposed Action Alternative, three (3) federally listed or protected mammal or invertebrate species have the potential to occur in the action area (monarch butterfly, Indiana bat, and northern long-eared bat). Federally listed plants and aquatic species would not be impacted by the proposed actions. No whorled sunflowers were observed during field surveys of the project site. No suitable habitat for threatened and endangered fish occurs on the project site. Firebelly

darter (*Etheostoma pyrrhogaster)*, northern madton (*Noturus stigmosus)*, and naked sand darter *Ammocrypta beani)* would not be impacted by the proposed actions. This species would not be impacted by the Proposed Action Alternative.

Monarch butterflies were recently listed under the Endangered Species Act as a candidate species. While there are there are no Section 7 requirements for this species as a candidate species, one individual of this species was observed during field review, flying over an open field portion of the site. Little milkweed was observed along the field margins, but no eggs or caterpillars were observed. Due to the small amount of suitable habitat that currently occurs on site proposed action would not impact populations of monarch butterfly. Following completion of the project, agricultural crops would be replaced with early successional habitat which may provide more flower plants than previously occurred on site. While no significant impacts are anticipated, proposed actions may ultimately benefit this species by providing suitable foraging habitat.

Field review of the project site determined that a total of 355 acres of suitable summer roosting habitat for Indiana bat and northern long-eared bat exists on site. Of the 304 acres proposed for clearing, approximately 56.63 acres identified as good quality habitat, 89.86 acres of marginal quality habitat would be cleared, and 157.17 acres of poor-quality habitat would be cleared (Figure provided in Appendix H). No suitable winter roosting habitat for these species occurs in the action area. Wetlands, streams and forested areas offer suitable foraging habitat for these species. Approximately 3.28 acres of wetland would be converted from forested habitat to meadow habitat by the proposed tree clearing. Four (4) minor direct stream impacts are proposed to accommodate the proposed access roads. Best management practices would be used around all remaining streams and wetlands to minimize potential impacts to bat foraging habitat. Tree removal is proposed between August 1 and March 31 of any given year. Tree removal at this time of year would avoid direct impacts to non-volant pups roosting in trees. Any disturbed individuals are expected to flush. Section 7 consultation under the Endangered Species Act is underway regarding potential impacts to federally listed bats.

3.5 VISUAL RESOURCES

This section provides an overview of existing visual resources within and surrounding the McKellar project site and potential impacts to visual resources that would be associated with the Proposed Action Alternative and No Action Alternative.

Visual resources are the characteristics of a place, both natural and manmade, that give a particular landscape its character and aesthetic quality. An observer's experience within or near a specific location can be determined by the visual resources at and surrounding that location. A viewshed is defined as the environment that is visible from a certain vantage point.

3.5.1 Affected Environment

The project site, located in rural Madison County, consists of approximately 942-acres of land currently used for agriculture and residential use. It is primarily farmland with gently rolling terrain. While there are some wooded areas within the project site, the land has previously been actively farmed. Several wetlands and streams were identified within the project site. The site is surrounded by agricultural fields, the McKellar-Sipes Regional Airport, a religious institution, and residential properties to the west and along Denmark Jackson Road, and industrial properties to

the north. Generally, the project site is rural and agricultural with several single-family residential homes on-site.

TVA's existing TL and associated 100-foot right-of-way crosses east-west in the northern portion of the site and follows the eastern boundary of the site south along Denmark Jackson Road. The majority of the existing TL right-of-way is comprised of maintained and agricultural land.

Due to its proximity to McKellar-Sipes Regional Airport, a glint and glare analysis was prepared for the Proposed Action Alternative.

3.5.2 Environmental Consequences

3.5.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be built and there would be no project-related changes to the visual character of the area. Existing views would be expected to remain unchanged.

3.5.2.2 Proposed Action Alternative

Construction of the solar facility would temporarily alter the visual character of the project site. During construction, heavy machinery would be present, changing the visual characteristics from vantage points surrounding the project site. In areas where grading would be necessary, minor changes to the contour, color, and texture of the ground surface would be visible. ECDs such as silt fences would likely be visible from many vantage points during construction. Visual impacts from construction would be minimal at night since most construction is anticipated to occur during the day. Erosion control silt fences and sediment traps would be removed once construction is complete.

Due to the project's proximity to the McKellar-Sipes Regional Airport, a glint and glare analysis was performed in accordance with FAA standards. The intent of the analysis was to identify the glare that could exist and determine if the glare would adversely impact surrounding properties, vehicles traveling along nearby roadways, or pilots approaching the McKellar-Sipes Airport. The Proposed Action Alternative would result in the installation of approximately 212,800 individual solar panels arranged over roughly 432 acres of the 942-acre area. At full extension, these panels are roughly 6-8 feet in height, depending on grade, and would have a setback of approximately 150 feet from residences along the east, south, and west boundaries. Vehicles traveling along Denmark Jackson Road would not experience adverse effects, such as glare, with no impact to driver's visibility. While views from surrounding properties may be slightly affected, the overall appearance of the solar panels will blend in with the immediate surrounding environment created by the regional airport and other industrial facilities.

The glint and glare analysis considered specifics to the PV panels, including single-axis tracking, surface material, and maximum tracking angle. The panels would face 60 degrees east and track the sun throughout the day until they face 60 degrees west at sunset. At sunset the modules would track to a flat stow position. The PV panel surface material would be a smooth glass with an AR coating. Considering the FAA Airport Solar Guide, upon review of the expected total footprint of the proposed solar facility, no glare occurrences for approaches to either of the runways at McKellar-Sipes Regional Airport nor the airport's Air Traffic Control Tower were identified (Capitol Airspace Group 2020).

Visual impacts associated with the proposed gentie would result in minor direct impacts to the visual landscape surrounding the project site. West of the proposed gentie easement is a

combination of forested and agricultural land. There is also a small forested area east of the proposed gentie. The construction activities associated with the gentie would be most visible from the north, along James Lawrence Road. Industrial development, including Pacific Manufacturing, Kirkland's Warehouse, Ryder Distribution Center, Kellog, and Toyota Bodine Aluminum are located east and north of the proposed gentie, along Smith Lane and James Laurence Road.

Since the TVA substation upgrades would be constructed within the footprint of the existing substation, no visual impacts would occur from the modifications.

While minor impacts are anticipated from the development of the solar facility, the project is located in an area of Madison County that has been identified for industrial growth and was recently rezoned for manufacturing and warehouses.

3.6 NOISE

This section provides an overview of existing noise within and surrounding the McKellar project site and potential impacts to noise that would be associated with the Proposed Action Alternative and No Action Alternative.

The magnitude and frequency of environmental noise may vary considerably over the course of the day, throughout the week, and across seasons, in part due to changing weather conditions and the effects of seasonal vegetation cover.

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is typically measured by the decibel (dB), which is used to express the ratio of one value of a physical property to another on a logarithmic scale. A day-night average sound level of 55 dBA is commonly used as a threshold level for noise which could result in adverse impacts, and prolonged exposure to levels above 65 dBA is considered unsuitable for residential areas (USEPA 1974).

3.6.1 Affected Environment

The proposed project would be developed on a 942-acre tract located between James Lawrence Road and SR 223, and additional land located south of Womack Lane and SR 223. Surrounding major sources of noise come from the operation of the airport and nearby industrial facilities and the surrounding roadways.

Few sensitive noise receptors occur within a 0.5-mile vicinity of the project site. Existing sensitive noise receptors include residences south and east of the site along Denmark Jackson Road, residences west of the site along Womack Road, and religious institutions east of the site along Denmark Jackson Road. Residences in these homes and religious institutions would experience temporary increases in noise during construction.

The proposed gentie is located west of Smith Lane and south of James Lawrence Road. The easement is composed of agricultural and forested land. One industrial facility is located east of the proposed gentie and one to the north, north of James Lawrence Road. There is a forested area that falls between the proposed gentie and existing industrial development along Smith Lane.

Noise regulations were reviewed for Madison County; no numerical limits were identified for the project.

3.6.2 Environment Consequences

3.6.2.1 No Action Alternative

Under the No Action Alternative, no noise impacts would occur from the construction or operation of the proposed solar facility, and the project would not result in related changes to noise levels in the area. Current noise impacts related to vehicle traffic and agricultural land use, would remain unchanged.

3.6.2.2 Proposed Action Alternative

The Proposed Action Alternative would result in short-term noise production related to construction activities. Construction equipment typically results in a maximum noise level within the range of 80-90 dBA, dropping to 71-81 dBA at 300 feet, and 50-60 dBA at 1,000 feet. Elevated noise levels caused by construction equipment could be experienced by nearby residents, but construction noise would be of short duration, and likely not exceed the 71-81 dBA noise level at nearby houses for prolonged periods. The construction work associated with pile driving will be the loudest and occur intermittently during daylight hours. Other construction-related noise will remain under 65 dBA for nearby residences. Work would generally occur 6 days per week (Monday through Saturday) from 7 am to 5 pm.

The nearest occupied houses are approximately 200-300 feet from the facility's southern and western boundary. Throughout the rezoning and planning process with the Madison County Commission and Planning Commission, project neighbors will be notified of project hearings and provided an opportunity to provide comments related to the scope.

Elevated noise levels from construction equipment (pile driving) could be perceptible above background noise but would be of short duration and would likely not exceed the 71-81 dBA noise level for prolonged periods. Maintenance activities, primarily mowing, would result in noise periodically; however, this noise would be similar to existing noises near the project site. The PV arrays would be electric-powered and produce little noise.

Under the Proposed Action Alternative, the arrays would connect to a total of 17 1,500V power inverters to convert the DC electricity generated by the solar panels into AC electricity. The locations of the proposed inverters are shown in Figure 2. Tracking equipment allowing PV modules to face the sun over the course of the day can generate a low level of noise. The noise generated by the inverters would not be audible above the ambient noise outside of the facility fence. The inverters would not be located within 500' of nearby residences.

Noise impacts associated with the construction of the gentie would be temporary, occurring during construction only. The temporary noise increases from vegetation removal and construction activities associated with the proposed gentie would be most noticeable from James Lawrence Road and industrial facilities north and east of the proposed gentie. Elevated noise levels would be temporary and would only occur during daytime hours. Maintenance activities, including vegetation management, would result in noise periodically; however, this noise would be comparable to existing noises near the project site. No noise related impacts are anticipated from the proposed TVA substation upgrades.

Overall noise impacts resulting from the Proposed Action Alternative would be insignificant.

3.7 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section describes the existing air quality and GHG emissions in the project site and region and the potential impacts on air quality and GHG emissions that would be associated with the No Action and Proposed Action Alternatives.

3.7.1 Affected Environment

The Clean Air Act (42 U.S.C. §7401 et seq.) mandates 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 micrometers (PM_{10}),
- Particulate matter whose particles are less than or equal to 2.5 micrometers ($PM_{2.5}$),
- Carbon monoxide (CO), and
- 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 9 (USEPA 2020b). 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 criteria pollutants (USEPA 2020d).

The system-wide emissions from TVA's electrical generating facilities are described in TVA's 2019 IRP Environmental Impact Statement (TVA 2019). TVA has reduced its emissions of criteria pollutants and greenhouse gases through the installation of emission controls at fossil fueled plants, idling and retirement of coal-fired generating units, increased use of low-emission generating facilities, and increased energy efficiency and demand reduction efforts.

Table 9. NAAQS Table

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours 1 hour	9 ppm 35 ppm	Not to be exceeded more than once per year
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m3 (1)	Not to be exceeded
Nitrogen Dioxide (NO2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2020

Abbreviations: ppb = parts per billion, ppm = parts per million, µg/m3 = micograms per cubic meter

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

3.7.1.1 Air Quality

Areas in compliance with the NAAQS are designated “attainment areas”. Areas not in compliance with the NAAQS are designated as “nonattainment areas”. Non attainment areas a usually defined by county. Areas that cannot be classified based on available information for a specific pollutant are designated as “unclassifiable” and are treated as attainment areas unless proven otherwise. If an area that was formerly designated as a nonattainment for a particular pollutant later qualifies as attainment, it is then categorized as “maintenance” for that pollutant for the next 20 years (as long as the area continues to meet the NAAQS for that pollutant) before qualifying to be designated to attainment. Based on available ambient air quality data, Madison County is currently in attainment for all criteria pollutants (USEPA 2020d). Based on Air Quality Statistics (as of May 5, 2020), Madison County, Tennessee has a recorded 7.5 $PM_{2.5}$ (weighted annal mean concentration) and 15 $PM_{2.5}$ (24-hr). 2019 County data for pollutants such as NO, CO, and SO_2 were not determined (USEPA 2019).

3.7.1.2 Regional Climate

Weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. West Tennessee's climate is characterized by warm, humid summers with average high temperatures up to 89 degrees Fahrenheit (°F) and cool winters with average low temperatures around 45 °F.

More specifically, In Jackson, TN, the summers are long, hot, and muggy. The winters are colder and wet. Over the course of the year, the temperature typically varies from 31 °F to 90 °F (Weatherspark 2020).

3.7.1.3 Greenhouse Gas Emissions

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. Carbon dioxide, methane, and nitrous oxide are among the most common GHGs emitted from natural processes and human activities.

The largest source of carbon dioxide and of overall greenhouse gas emissions is fossil fuel combustion. Agricultural activities, including various management practices (i.e., irrigation, tillage, fertilizer application) can lead to the production and emissions of nitrous oxide (EPA 2020c).

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no project-related impacts to air quality or climate change would occur as the proposed solar facility would not be constructed. No air pollutants or GHG emissions would be generated by equipment or vehicles from construction or operation of the solar facility. Existing land use would remain a mix of residential, agricultural, and forested, with little effect on climate and air quality.

3.7.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, minor impacts to air quality would occur during the construction of the facility. Only minimal air impacts would be expected, as construction might result in localized dust and fumes from equipment. The construction would likely involve the use of diesel-powered machinery and thereby create small amounts of air borne dust and debris. Emissions associated with diesel fuels by internal combustion engines would generate local emissions, including carbon monoxide, nitric oxide, and sulfur dioxide during construction (an increase of GHG during construction). The impacts on air quality are expected to be minimal and short-lived. Any emissions would be temporary and would not adversely impact the environment.

Approximately 432 acres of the project site would be subject to ground disturbing activities, which includes vegetative clearing. Properly implemented control and suppression measures, as well as BMPs and standard erosion control measures, such as reseeding, would minimize the potential for wind erosion. Tree and other tall vegetation removed during construction to accommodate the panel layout and gentie would represent a minor loss of sequestered carbon, as well as potential future carbon sequestration. No adverse impact to air quality and GHGs is anticipated from the proposed TVA substation upgrades.

The operation of the solar facility is not anticipated to have any adverse impacts to air quality or greenhouse gas emissions, as only minor maintenance would be expected to occur, which would not constitute a major source of air pollutants. The operation of the solar facility would result in

minor reduction in GHG emissions as the carbon dioxide-free power generated by the solar facility would displace power which would otherwise be generated in part by fossil fuels. This would result in minor beneficial impacts to air quality (TVA 2015).

3.8 CULTURAL RESOURCES

This section describes an overview of the existing cultural resources within the project site and potential impacts on these cultural resources that would be associated with the Proposed Action Alternative and No Action Alternative.

Cultural resources are prehistoric and historic archaeological sites, districts, buildings, structures, and objects, as well as locations of historic events of importance. Cultural resources that are listed, or determined to be eligible for listing, on the National Register of Historic Places (NRHP) maintained by the National Park Service are considered historic properties. As a Federal corporate agency, TVA is required by Section 106 of the National Historic Preservation Act (NHPA) to evaluate the potential effects of its actions on historic properties (36 CFR Part 800). When a TVA action would adversely affect a historic property, TVA must, in consultation with state historic preservation officers, federally-recognized Indian tribes, and other stakeholders, consider ways to avoid or minimize the adverse effect. If avoidance or minimization are not feasible, measures to mitigate the adverse effect must be taken.

3.8.1 Affected Environment

In accordance with Section 106 of the NHPA, a Phase I cultural resource survey to document and assess resources located within the survey area associated with the proposed project was conducted. The archaeological survey area consisted of the 942-acre project site where the solar array is proposed for construction, including the gentie within a 50-foot wide right-of-way. The area of potential effects (APE) for the architectural study consisted of the project site, in addition to areas visually connected to it via viewshed to and from the project site within a 0.5-mile radius. Areas within the architectural survey radius that were determined not to be within view of the proposed undertaking due to terrain, vegetation, and/or modern built environments were not considered part of the architectural APE.

The survey was conducted to provide an inventory of resources within the survey area, descriptions of the condition of any resources identified, and recommendations regarding their NRHP eligibility. All work was consistent with the Secretary of the Interior's Standards and Guidelines for Identification (NPS1983) and met the minimum requirements established by TDEC (2018).

The architectural assessment, conducted in May 2020 and November 2020, resulted in the identification of one previously recorded architectural resource (Smith Farm, MD-IP-4) within the architectural APE. MD-IP-4 is located in the information files containing a 2004 Tennessee-Department of Transportation survey report, which determined the farm as ineligible for NRHP listing. Based on the results of the survey, MD-IP-4 is recommended ineligible for NRHP listing under Criteria A, B, and C. Historic architectural resources MD-IP-1 through MD-IP-3 are also recommended as ineligible for NRHP listing due to lack of historic and architectural significance coupled with compromised integrity (TVAR 2020).

An archaeological survey was conducted between May 11 to July 27, 2020 and resulted in the identification of 71 cultural resources within the project site, including 13 newly recorded sites

(40MD267, 40MD268, 40MD269, 40MD270, 40MD271, 40MD272, 40MD273, 40MD274, 40MD275, 40MD276, 40MD277, 40MD278, and 40MD279), five (5) non-site cultural resources, and 53 isolated finds. Based on the survey, eight of these sites are not recommended eligible for inclusion in the NRHP. The five (5) non-site cultural resources and 53 isolated finds lack significant research potential beyond the findings of the phase I survey and are not recommended eligible for listing on the NRHP. Five sites (40MD270, 40MD272, 40MD273, 40MD276, and 40MD279) warrant an NRHP eligibility status of undetermined. These five sites are recommended for avoidance or additional testing to better ascertain the NRHP eligibility statuses of these resources (TVAR 2020).

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No Action Alternative, the existing land use would be expected to remain unchanged. Therefore, no impacts to cultural resources would occur as the site would not be developed as a solar facility.

3.8.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, as no NRHP listed or eligible for listing sites were identified on-site, no adverse impacts to architectural resources are anticipated. Unless plans change or new concerns are brought to light, no additional investigations of above-ground resources have been recommended (TVAR 2020).

The Proposed Action Alternative would not impact any listed or eligible NRHP archaeological sites. A 20 meter buffer is proposed to avoid ground disturbance between the proposed development of the five (5) sites (40MD270, 40MD272, 40MD273, 40MD276, and 40MD279) that are recommended an NRHP eligibility status of undetermined. Unless plans change or new concerns are brought to light, no further archaeological investigations were recommended in connection with the proposed project. SR McKellar and TVA have an agreement letter in place to avoid these sites and associated buffer during construction and operation of the project for the life of the PPA. TVA has also consulted with federally-recognized Indian tribes regarding properties within the proposed project's APE that may be of religious or cultural significance to them, or eligible for the NRHP. On January 4, 2021, the Tennessee State Historic Preservation Office (SHPO) concurred with TVA's findings. The consultation documentation is included in Appendix I.

The TVA substation upgrades would occur within the footprint of the existing substation, so no impacts to cultural resources are anticipated from the modifications.

Should previously undiscovered cultural resources be identified during construction or operations, a Secretary of the Interior qualified archaeologist and the SHPO will be consulted before any further action is taken.

3.9 SOLID AND HAZARDOUS WASTES

This section describes an overview of existing waste management (solid and hazardous waste) within the project site and potential impacts to waste management that would be associated with the No Action Alternative or Proposed Action Alternative.

3.9.1 Affected Environment

An ASTM standard E1527-13 Phase I Environmental Site Assessment (ESA) was performed on the site in June 2020 and resulted in the following findings:

- The GeoSearch Radius Report did not identify any listings for the subject property. No significant findings were discovered for the adjacent properties.
- Some areas of the site had improper solid waste disposal of items such as tires and about four old cars. While these areas did not appear to represent a significant environmental impact to the site, the waste is recommended to be removed from the property and properly disposed.
- The subject property has an abandoned railway bed across the southeast portion of the site that has existed since at least the 1940s. While it appears that the railroad tracks and ties have been removed, the railbed soil remains. Rail corridors commonly have residual contamination from railroad operations including: heavy metals, polynuclear aromatic hydrocarbons (PAHs), and oil/fuel constituents. A soil investigation was completed in August 2020 which found no evidence of contamination associated with the railway bed.
- A total of five underground storage tanks (USTs) were found at three locations at the site. At the time of the report, all five USTs discovered have been properly removed from the ground and disposed of off-site at an appropriate facility. One UST had a small amount of diesel impacted soil that was excavated from the tank pit and is currently being prepared for final disposal off site.

Following completion of the Phase I ESA, a soil assessment was performed along the former railroad. Five (5) soil samples were collected along the length of the former railroad, along both sides at depths from 0 to 2 feet below the ground surface. The five (5) collected samples had detections of arsenic, barium, chromium, and lead. The sample collected from S-2 had the following PAHs detected: acenaphthylene, benzo(a)anthracene benzo(b)fluorathene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. The arsenic concentrations exceeded the EPA Regional Screening Levels (RSLs) but were below the accepted naturally occurring background level for Tennessee. While the arsenic concentration of S-2 exceeded the EPA RSL and the regional background concentration, the elevated arsenic may fall within the site-specific background levels and be naturally occurring. The concentrations of PAHs in sample S-2 was also the only sample to have detections of PAHs and were below the EPA RSLs. Based on the survey, the former railroad does not have a significant environmental impact on the site and no further soil investigations are recommended.

Five 500-gallon USTs have been removed from the site. Two tanks were located on the portion of the site east of Denmark Jackson Road, two tanks were located near the barn off Womack Lane, and one tank was located near the abandoned house near the central portion of the site. During removal of the USTs, field screening was completed with a photoionization detector for all samples. Samples were collected from the tank pit (excavated material) and from beneath each end of the tank. Laboratory analysis based on the analysis laid out by TDEC Division of Underground Storage Tanks (DUST) UST Closure Assessment Guidelines was done by Pace Analytical. Except for Extractable Petroleum Hydrocarbons (EPH), there were no exceedances in the samples collected. EPH is used as a soil screening tool in the event that monitoring wells are needed, as EPH can detect old constituents which have degraded below regulated levels otherwise.

An approximately 1,000-gallon propane tank was observed on the south-central portion of the site. Three approximately 1,000-gallon diesel aboveground storage tanks (ASTs) were observed on the west side of the barn off Womack Lane. No significant staining was observed below the ASTs. There was no other evidence of ASTs observed on the subject property at the time of the site reconnaissance.

3.9.2 Environmental Consequences

3.9.2.1 No Action Alternative

Under the No Action Alternative, no project-related impacts associated with solid and hazardous waste would occur. Existing land use would be expected to remain agricultural and residential, and existing waste management conditions would be expected to remain as they are currently.

3.9.2.2 Proposed Action Alternative

Construction activities and facility operation under the Proposed Action Alternative would generate solid waste. Oily rags, worn or broken metal and machine parts, defective or broken electrical materials, other scrap metal and plastic, broken down module boxes, empty containers, paper, glass, and other miscellaneous solid wastes would be generated throughout all phases of the proposed project. Waste would be disposed by means of contracted refuse collection and recycling services. All applicable regulatory requirements would be followed in the collection and disposal of waste to minimize health and safety effects. Decommissioned equipment and materials, including PV panels, racks, and transformers, would be recycled. Materials that cannot be recycled would be disposed of at an approved facility.

Phase I ESA findings would not have an impact on the Proposed Action Alternative as hazardous materials are not likely to be encountered during construction. No hazardous waste would be generated during the construction and operation of the facility. During construction and operation of the facility, any materials determined to be wastes would be evaluated (e.g., waste determinations) and managed (e.g., inspections, container requirements, permitted transport, and disposal) in accordance with the Solid and Hazardous Wastes Rules and Regulations of the State of Tennessee (TDEC DSWM Rule 0400 Chapters 11 and 12, respectively). The TVA substation upgrades would occur within the existing substation footprint. All applicable regulatory requirements would be followed, and waste would be properly disposed of should the upgrade be completed.

Procedures to limit fuel spills would be implemented during construction and operation of the facility. Details regarding the handling of fluid spills and general trash will be included in the SWPPP. Waste generated during operation would be minimal and would mainly result from replacement of equipment. Nonhazardous wastes would be disposed of in an approved, operating landfill. Bulk chemicals would be stored in storage tanks or in returnable delivery containers. The transport, storage, handling, and use of all chemicals would be conducted in accordance with applicable laws, ordinances, regulations, and standards.

Upon expiration of the 15-year PPA or an amended or alternative PPA for the sale of power after the 15-year period, SR McKellar would develop a decommissioning plan to document the recycling and/or disposal of solar facility components in accordance with applicable regulations. To the extent possible, waste would be recycled. More specifically, portions of the panels that could be recycled, including steel, glass, and aluminum would be recycled. Materials that cannot be recycled would be disposed of at a landfill or approved facility to be determined by the

contractor(s). Impacts from the generation of hazardous waste during the construction and operation of the proposed facility would be insignificant.

3.10 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

This section provides an overview of existing public health and safety at the project site and the potential impacts to public health and safety associated with the No Action Alternative and Proposed Action Alternatives.

3.10.1 Affected Environment

The project site is currently private property, an agricultural and rural-residential area. Public emergency services in the area include urgent care clinics, hospitals, law enforcement services, and fire protection services. A brief description of the public emergency services, relative to the project location is provided below:

- Fast Pace Health Urgent Care (Jackson, TN) – approximately 9 miles SE from the site
- The Jackson Clinic-South Campus (Jackson, TN) – approximately 9 miles SE from the site
- Tennova Walk-In Clinic (Jackson, TN) – approximately 10 miles SE from the site
- Jackson-Madison County General Hospital (Jackson, TN) – approximately 10 miles NE from the site
- Jackson Police Department (Jackson, TN) – approximately 9 miles NE from the site
- Madison County Sheriff's Office (Denmark, TN) – approximately 1 mile E from the site
- Madison County Fire Department (Jackson, TN) – approximately 2 miles NE from the site
- Jackson Fire Department (Jackson, TN) – approximately 9 miles NE from the site

3.10.2 Environmental Consequences

3.10.2.1 No Action Alternative

Under the No Action alternative, the proposed solar facility would not be constructed; therefore, no project related impacts on public health and safety would result. Existing land use would remain a mix of agricultural and some forested land. No changes to existing public health and safety would occur.

3.10.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, during construction, workers on the project site would have an increased safety risk. However, standard construction site practice includes the establishment and maintenance of health and safety plans to comply with Occupational Safety and Health Administration (OSHA) regulations. Health and safety plans emphasize BMPs for site safety to minimize risk to construction staff. This may include use of personal protective equipment, regular safety inspections, use of equipment guards, and establishment of emergency shutdown procedures.

Fuel for construction vehicles may be stored on-site during construction. Hazardous materials stored on site would not be available to the public. Emergency response for any potential incidents on the project site would be provided by the local, regional, and state law enforcement, fire, and emergency responders.

Potential public health and safety hazards could result in increased traffic on nearby roadways due to construction of the site. Communication of increased industrial traffic and establishment of traffic procedures to minimize potential safety concerns would be addressed in the health and safety plans followed by the construction contractor. No impacts to public and occupational health are anticipated from the proposed TVA substation upgrades.

No public health or safety hazards are anticipated as a result of the construction of the Proposed Action Alternative. Overall, impacts to public health and safety would be temporary and minor.

3.11 TRANSPORTATION

This section describes roadways and other transportation infrastructure serving the project site and surrounding area, and potential impacts on transportation that would be associated with the No Action Alternative and Proposed Action Alternative.

3.11.1 Affected Environment

The project site is located just outside the City of Jackson limits, south of I-40 and south of Route 40. More specifically, the site is east of Vine Hill Road, west of Smith Lane, and south of James Lawrence Road. Womack Lane bisects the site west-east and Denmark Jackson Road bisects the eastern portion of the site southwest-northeast. McKellar-Sipes Regional Airport is located approximately one-mile north east of the project site, east of Smith Lane.

Several industrial facilities, including Kellogg, Ryder Distribution Center, Kirkland's Warehouse, and Pacific Manufacturing Tennessee, Inc. are located north east of the project site, east of Smith Lane. Approximately 40 residences are located within a 0.5-mile radius of the project site, along Denmark Jackson Road and Womack Road. The Old Denmark Road Church of Christ and Family Christian School are located east of the project, near the intersection of Denmark Jackson Road and Smith Lane.

3.11.2 Environmental Consequences

3.11.2.1 No Action Alternative

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

3.11.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, the construction and operation of the proposed solar facility would have no effect on operation of the nearby McKellar-Sipes Regional Airport, located approximately one-mile north east of the project site. The distance between the regional airport and the proposal solar facility, coupled with the existing industrial development and roadways between the proposed solar facility, serve to minimize any effects the proposed solar facility may have on air traffic. The operation of the solar facility would not affect commercial air passenger or freight traffic in the region.

During construction of the solar facility, an average crew of approximately 275 with a maximum of 300 workers would be present at the site from 7 am to 5 pm, 6 days a week (Monday through Saturday) for approximately 12 months. The majority of the workers would be from the local or regional area, and approximately 40 percent of the workforce would be supervisory personnel

that would likely come from out-of-state and many would stay in local hotels near or within Jackson, TN. Workers would either drive their own vehicles or carpool to the project site. Parking would be onsite during the day. Some work teams may visit local restaurants and business during work hours. Additional traffic due to deliveries and waste removal would consist of a maximum of approximately 15-20 vehicles per day during construction.

Traffic flow around the work site would be heaviest at the beginning of the workday, at lunch, and at the end of the workday. Deliveries and most workers would access the project site from the east on Womack Road, or from the center of the site on Denmark Jackson Road. No major industries are located at the site access points. Should traffic flow be a problem for local residences, churches, and school, SR McKellar would consider staggered work shifts to space out the flow of traffic to and from the project site. Use of such mitigation measure would minimize potential adverse impacts to traffic and transportation to less than significant levels.

Several on-site 16-20-foot-wide maintenance roads would be constructed and maintained on the project site. These roadways would serve for periodic access for site inspection and maintenance and closed for through traffic. No impacts to transportation or traffic are anticipated from the proposed TVA substation upgrades.

The solar facility is not manned during operation; however, maintenance is required quarterly and for equipment failures and would require minimal personnel. Therefore, the operation of the solar facility would not have a noticeable impact on local roadways. Overall, the Proposed Action would not result in indirect impacts to transportation.

3.12 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section describes an overview of existing socioeconomic conditions and environmental justice considerations that would be associated with the No Action Alternative and Proposed Action Alternative.

EO 12898 on Environmental Justice directs Federal agencies to consider the impacts of their actions on minority and low-income populations and to avoid disproportionate impacts to those populations. While TVA is not listed as a Federal agency subject to EO 12898, TVA typically addresses environmental justice concerns through its NEPA analysis for Federal projects.

3.12.1 Affected Environment

The proposed project is located in a rural area of Madison County approximately nine miles west of the center of Jackson. Based on U.S. Census data available through the EPA's EJSCREEN, 34 people live within a one-mile radius of the project site, less than 0.01 percent of the Madison County population of 97,984 (Census 2018). Tables 10 and 11 below provide a breakdown of relevant population, income, and poverty data.

Table 10. Project Site Population

MCKELLAR SOLAR PROJECT POPULATION DATA					
Geography	**Population**	**Minority Population**			
	Total	White	Percent White	Minority	Percent Minority
Tennessee	6,829,174	5,354,072	78.40%	1,475,102	21.60%
Jackson, TN Metro Area	67,191	33,797	50.30%	33,394	49.70%
Madison County, Tennessee	97,984	57,713	58.90%	40,271	41.10%
1-Mile Radius - Project site	34	28	81%	7	19%

Sources:

*U.S. Census Bureau. American Fact Finder; 2018 ACS 5-year estimates. Accessed September 21, 2020. https://factfinder.census.gov/faces/nav/jsf/pages/index/xhtml.

*USEPA. EJSCREEN. Accessed September 21, 2020. Available at: https://ejscreen.epa.gov/mapper/

Recorded population within the one-mile radius is predominantly white, with 81 percent reporting race as white and 19 percent minority (USEPA 2020a). The reported minority population within the one-mile radius is over 22 percentage points lower than the Madison County minority population of 41.1 percent, which is more than double Tennessee's 21.6 percent minority population.

Within one mile of the project site, a slightly higher per capita income, $32,022, has been reported as compared to Madison County's per capita income of $25,555. While median household income is not reported at this level through EJSCREEN, it is likely that the median household income within one mile of the project site is slightly above the median Madison County household income of $46,223.

Table 11. Project Area Income and Poverty

MCKELLAR SOLAR PROJECT INCOME AND POVERTY DATA						
Geography	**Median and Per Capita Income**			**Poverty Level**		
	Total Households	Median Household income	Per Capita income in the past 12 months	Population for whom poverty status is determined	Population below poverty level	Percent below poverty level
Tennessee	2,567,061	$50,972	$28,511	13.90%	1,024,376	15%
Jackson, TN Metro Area	25,773	$41,606	$24,487	24.10%	N/A	N/A
Madison County, Tennessee	37,729	$46,223	$25,555	17.80%	17,147	17.50%
1-Mile Radius - Project Site	17	N/A	$32,022	N/A	N/A	N/A

Sources:

*U.S. Census Bureau. American Fact Finder; 2018 ACS 5-year estimates. Accessed September 21, 2020. https://factfinder.census.gov/faces/nav/jsf/pages/index/xhtml.

*USEPA. EJSCREEN. Accessed September 21, 2020. Available at: https://ejscreen.epa.gov/mapper/

3.12.2 Environmental Consequences

3.13.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no project-related socioeconomic impacts within Madison County would occur. Further, disproportionate impacts to the low-income or minority populations in the project site would occur.

3.12.2.1 Proposed Action Alternative

Under the Proposed Action Alternative, 275-300 workers would be employed during construction of the solar facility, lasting approximately 12 months. A majority of these workers would be based in the local area, leading to a short-term beneficial impact on the local economy.

No impacts to socioeconomics or environmental justice would occur from the proposed TVA substation modifications.

Operation of the facility would not result in an increase in local employment as no workers would be needed for day-to-day operation of the solar facility. While periodic maintenance activities, primarily mowing, would be done by local workers, this would not result in an increase in employment. Although it is too early to quantify, the project would benefit the local tax base through the increased property taxes due to site improvements.

While there are only limited and short-term benefits to the labor force, the project and the diversification of energy sources better positions the Jackson region and the State of Tennessee in economic development ventures.

When compared to state and county data, there is no high-concentration of minority population near the project. While there is what would potentially be considered a low-income population near the project site, the overall impacts of the solar facility, most of which would occur during the short construction period, would be minor. The off-site impacts (i.e., to surrounding properties) would be negligible. Consequently, there would be no disproportionately adverse impacts to minority and low-income populations.

3.13 CUMULATIVE IMPACTS

CEQ regulations define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR § 1508.7 issued in 1978). Cumulative impacts should be considered early in the project development process, as identification of potential cumulative impacts may assist in the design and selection of alternatives and mitigation measures to minimize a project’s environmental impacts.

As described above, the construction and operation of the solar facility under the Proposed Action Alternative would not affect some environmental resources and would have only minor adverse impacts to other resources, such as air quality and visual resources. There are no known planned projects in the area that would likely contribute to cumulative impacts associated with the proposed solar facility. No projects within the vicinity of the proposed solar facility appear in the Tennessee Department of Transportation 2020-2023 Tennessee Transportation Improvement Program.

Due to the proposed project's proximity to the McKellar-Sipes Regional Airport, SR McKellar has been in communication with the Jackson-Madison County Airport Authority to discuss the project and address any concerns that may arise from its development. As previously discussed, a glint and glare analysis determined that the installation of solar panels near the airport would have no impact on pilots or air traffic controllers (Capitol Airspace Group 2020).

Additional consideration has been given to solar facility development near airports and wildlife attraction. Solar arrays are not uncommon at and near airport facilities. While the SR McKellar facility is proposed for private property and the Federal Aviation Administration (FAA) guidance is predominantly intended for the development of solar facilities on airport land, FAA policy was reviewed for potential application to the proposed project. In 2018, the FAA provided the Technical Guidance for Evaluating Selected Solar Technologies on Airports. According to the FAA, one advantage to constructing solar facilities at airports is that on-airport open space is often previously disturbed or is actively managed in accordance with formal vegetation and wildlife management plans to keep vegetation from penetrating airspace or becoming a wildlife habitat (FAA 2018). While the FAA guidance states that existing solar facilities on airport property do not appear to be wildlife attractants, it recommends that the environmental screening process should look carefully at potential wildlife impacts.

In addition to FAA guidance, research from the USDA National Wildlife Research Center concluded that converting airport grasslands to PV arrays would not increase hazards associated with bird strikes. The results of this study found that while there were birds observed in areas with solar arrays, the number and type of birds did not necessarily increase the risk of bird strikes. This particular study concluded that observed species did not conflict with safety regulations concerning wildlife at airports and went on to suggest that conversion of airfield habitat to PV arrays in some locations could decrease bird-strike risk relative to current grass or other natural land covers used on airports (DeVault et al. 2014).

The FAA published the draft Advisory Circular (AC) on Hazardous Wildlife Attractants on or near Airports. The AC provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports (FAA 2020). While solar arrays are not discussed in this document, as they are not generally considered a wildlife attractant, general planning and management of wildlife attractants near airports are outlined in the document. The AC directs airports to work with nearby landowners and managers to cooperatively develop procedures to monitor and manage identified hazardous wildlife attractions. Appropriate contact information has been exchanged between SR McKellar and McKellar-Sipes Regional Airport to establish an open line of communication in the event of questions or concerns as project development, construction, and operation moves forward.

Based on the low level of anticipated impacts to the resources described above, and the lack of cumulative impacts from proposed local projects near the project site, the Proposed Action Alternative would not result in any adverse cumulative impacts.

CHAPTER 4

4.0 LIST OF PREPARERS

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Experience: 5 years in regulatory compliance, preparation of NEPA/environmental review documents, and permitting
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CHAPTER 5

5.0 REFERENCES

Capitol Airspace Group. 2020. *SR McKellar Solar Project Glint & Glare Analysis*.

City of Jackson. 2015. One Jackson Civic Master Plan. Accessed September 6, 2020 at https://jacksontn.gov/UserFiles/Servers/Server_16361603/File/Departments/Planning/Civic%20Master%20Plan/One%20Jackson%20Civic%20Master%20Plan%20-%20Adopted%2008042015.pdf.

Cornell University. 2020a. All About Birds: American Kestrel. Cornell Lab of Ornithology, Cornell University. Accessed September 10, 2020 at https://www.allaboutbirds.org/guide/American_Kestrel/overview.

Cornell University. 2020b. All About Birds: Wood Thrush. Cornell Lab of Ornithology, Cornell University. Accessed September 10, 2020 at https://www.allaboutbirds.org/guide/Wood_Thrush.

DeVault, Travis L.; Seamans, Thomas W.; Schmidt, Jason A.; Belant, Jerrold L.; Blackwell, Bradley F.; Mooers, Nicole; Tyson, Laura A.; and VanPelt, Lolita. 2014. Bird Use of Solar Photovoltaic Installations at US Airports: Implications for Aviation Safety. USDA National Wildlife Research Center - Staff Publications. 1418. Accessed August 20, 2020. Available at: https://digitalcommons.unl.edu/icwdm_usdanwrc/1418.

Executive Order 11988, Floodplain Management, FR Vol. 42, No. 101—Wednesday, May 25, 1977. pp. 26951-26957.

Federal Aviation Authority (FAA). 2018. Technical Guidance for Evaluating Selected Solar Technologies on Airports. Accessed December 20, 2020. Available at: https://www.faa.gov/airports/environmental/policy_guidance/media/FAA-Airport-Solar-Guide-2018.pdf

_____. 2020. Advisory Circular Hazardous Wildlife Attractants on or near Airports (AC No: 150/5200-33C). Accessed November 17, 2020. Available at: https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-33C.pdf

Federal Emergency Management Agency (FEMA). 2020. Flood Map Service Center. Accessed September 6, 2020. Available at: https://msc.fema.gov/portal/home.

Dison, B., Ratliff, L., Davidson, S., Webb, D., Bass, H., Rael, J., Carnell, B., Johnson, H., Cowart, K. (TVAR). 2020. *A Phase I Cultural Resources Survey of a Planned Solar Array in Madison County, Tennessee*. Prepared by Tennessee Valley Archaeological Research for Silicon Ranch Corporation.

Kurta, A., S. W. Murray, and D. H. Miller. 2002. Roost selection and movements across the summer landscape. Pages 118-129 in A. Kurta and J. Kennedy, editors. The Indiana Bat: Biology and Management of an Endangered Species. Bat Conservation International, Austin, Texas.

Madison County. 2015. Zoning Resolution of the Madison County Outer Region. Accessed October 7, 2020. Available at:

https://jacksontn.gov/UserFiles/Servers/Server_16361603/File/Departments/Planning/Forms%20&%20Documents/Zoning/Outer%20Region%20Zoning%20Resolutions.pdf.

National Park Service (NPS). 1983. Secretary of the Interior's Standards and Guidelines [As Amended and Annotated]. Accessed September 9, 2020. Available at: https://www.nps.gov/history/local-law/arch_stnds_0.htm.

_____. 2018. Earth Science Concepts Coastal Plain Physiographic Province. Accessed September 22, 2020. Available at: https://www.nps.gov/articles/coastalplain.htm.

NatureServe. 2020. NatureServe Explorer. Accessed on September 9, 2020 at http://explorer.natureserve.org.

Tennessee Department of Conservation (TDEC). 2018. Tennessee SHPO Standards and Guidelines for Archaeological Resource Management Studies. Accessed September 22, 2020. Available at: https://www.tn.gov/content/dam/tn/environment/archaeology/documents/arch_TNSHPO_2018.pdf.

_____. *Tennessee Erosion and Sediment Control Handbook* - Division of Water Resources. Nashville, TN. 4th Edition. 2012. Accessed October 6, 2020. Available at: https://tnepsc.org/TDEC_EandS_Handbook_2012_Edition4/TDEC%20EandS%20Handbook%204th%20Edition.pdf.

_____. 2013. Rules of the Tennessee Department of Environment and Conservation - Use Classifications for Surface Waters. Accessed October 7, 2020. Available at: https://publications.tnsosfiles.com/rules/0400/0400-40/0400-40-04_20160301.pdf.

_____. 2016. *General NPDES Permit for Discharges of Stormwater Associated with Construction Activities*. Accessed September 22, 2020. Available at: http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9034:34051:0::NO:34051:P34051_PERMIT_NUMBER:TNR100000

_____. 2020. Proposed Final Year 2016 303 (d) List. Division of Water Resources. Nashville, TN. Tennessee Department of Environment and Conservation (TDEC). Accessed December 21, 2020. Available at: https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html.

Tennessee Valley Authority (TVA). 1981. Class Review of Repetitive Actions in the 100-Year Floodplain, FR Vol. 46, No. 76—Tuesday, April 21, 1981. pp. 22845-22846.

_____. 1983. Procedures for Compliance with the National Environmental Policy Act. Accessed September 2, 2020. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/nepa-environmental-reviews/tva_nepa_procedures_18_cfr_part_1318_effective_4-27-2020.pdf?sfvrsn=c34f6fe3_4

_____. 2014. TVA Solar Photovoltaic Projects Final Programmatic Environmental Assessment. Accessed October 6, 2020 at https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/environmental-reviews/tva-solar-photovoltaic-projects/pv-final-pea-solar-pv-reduced-size.pdf?sfvrsn=5b15a107_2.

_____. 2015. Integrated Resource Plan. Accessed September 22, 2020. Available at: https://www.tva.com/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/IRP/Documents/2015_irp.pdf.

_____. 2019. Integrated Resource Plan Final Supplemental Environmental Impact Statement. Accessed September 22, 2020. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4

U.S. Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0). Accessed September 28, 2020. Available at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046490.pdf.

U.S. Census Bureau (Census). 2018. American FactFinder; 2018 ACS 5-year estimates. Accessed September 21, 2020. Available at: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2014. Farmland Protection Policy Act. Accessed September 28, 2020. Available at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATIO%20N&cid=nrcs143_008275&navid=100170180000000&position=Welcome.Html&ttype=%20detail.

U.S. Department of Agriculture, Natural Resources Conservation Service Web Soil Survey (USDA NRCS). 2020. Accessed November 12, 2020. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

U.S. Department of Agriculture, Natural Resources Conservation Service Soil Data Access (USDA) Prime and other Important Farmlands (USDA NRCS). 2020. Accessed November 11, 2020. Available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

U.S. Department of Transportation (USDOT). 2006. FHWA Highway Construction Noise Handbook. Federal Highway Administration. Accessed October 6, 2020. Available at: https://rosap.ntl.bts.gov/view/dot/8837.

U.S. Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. March 1974. Prepared by the U.S. Environmental Protection Agency Office of Noise Abatement and Control. Accessed September 23, 2020. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF.

_____. 2019. Air Quality – Cities and Counties. Accessed December 21, 2020. Available at: https://www.epa.gov/air-trends/air-quality-cities-and-counties

_____. 2020a. Environmental Justice Screening and Mapping Tool (USEPA EJSCREEN). Accessed September 21 2020. Available at: https://ejscreen.epa.gov/mapper/.

_____. 2020b. NAAQS Table. Accessed October 6, 2020. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

_____. 2020c. Overview of Greenhouse Gases. Accessed October 6, 2020. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-tablehttps://www.epa.gov/ghgemissions/overview-greenhouse-gases.

_____. 2020d. Areas for Criteria Pollutants (USEPA Green Book). Accessed October 6, 2020. Available at: https://www.epa.gov/green-book.

_____. 2020e. Interactive Map of Sole Source Aquifers. Accessed December 20, 2020. Available at: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b.

_____. 2020f. Air Emissions Inventories. 2017 National Emissions Inventory Data. Accessed December 21, 2020. Available at: https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data

U.S. Fish and Wildlife Services (USFWS). 2015. Threatened Species Status for the Northern Long-eared Bat with 4(d) Rule. April 2015. Accessed on September 9, 2020 at https://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07069.pdf.

_____. 2020a. Critical Habitat for Threatened & Endangered Species [USFWS] Online Mapper. Accessed September 9, 2020. Available at: https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.

_____. 2020b. Information for Planning and Conservation (IPaC). Accessed September 9, 2020. Available at: http://ecos.fws.gov/ipac/.

_____. 2020c. Environmental Conservation Online System: Species Profile for Indiana Bat (Myotis sodalis). Accessed September 9, 2020. https://ecos.fws.gov/ecp/.

_____. 2020d. Environmental Conservation Online System: Species Profile for Northern Long-Eared Bat (Myotis septentrionalis). Accessed September 9, 2020. https://ecos.fws.gov/ecp/.

_____. 2020e. Range-Wide Indiana Bat Survey Guidelines. Accessed February 16, 2021. https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/FINAL%20Range-wide%20IBat%20Survey%20Guidelines%203.23.20.pdf

_____. 2020f. Pollinators. Accessed February 16, 2021. https://www.fws.gov/pollinators/Features/Monarch_Butterfly.html

U.S. Geological Survey (USGS). 1995. Ground Water Atlas of the United States; Segment 10 Illinois, Indiana Kentucky, Ohio, Tennessee. Hydrologic Investigations Atlas 730-k. Reston, VA. Accessed December 20, 2020 at: https://pubs.usgs.gov/ha/730k/report.pdf

US Geological Survey (USGS). 2018. Seismic Hazard Maps and Site-Specific Data. Accessed September 22, 2020. Available at: https://www.usgs.gov/natural-hazards/earthquake-hazards/maps.

U.S. Water Resources Council. 1978. Guidelines for Implementing Executive Order 11988, Floodplain Management. FR Vol. 43, No. 29—Friday, Feburary 10, 1978. pp. 6030-6054.

Weatherspark. 2020. Average Weather in Jackson, Tennessee, Untied States. Accessed December 21, 2020. Available at: https://weatherspark.com/y/13185/Average-Weather-in-Jackson-Tennessee-United-States-Year-Round