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RIVER BEND SOLAR PROJECT
Lauderdale County, Alabama

FINAL ENVIRONMENTAL ASSESSMENT

Prepared for:
Tennessee Valley Authority
Knoxville, Tennessee

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Acronym	**Definition**
ADCNR	Alabama Department of Conservation and Natural Resources
AADT	Average Annual Daily Traffic
AC	alternating current
ACDNR	Alabama Department of Conservation and Natural Resources
ADECA	Alabama Department of Economic and Community Affairs
ADEM	Alabama Department of Environmental Management
ADOT	Alabama Department of Transportation
AF	acre-feet
AMEC	AMEC Environment & Infrastructure, Inc.
APE	area of potential effect
BMP	best management practice
ca.	circa
CAA	Clean Air Act
CBMPP	Construction Best Management Practices Plan
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CR	county road
dB	decibel
dBA	decibel A-weighted
DC	direct current
DNL	day-night average sound level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPSC	erosion prevention and sediment control
ESA	Endangered Species Act
FACW	facultative wetland
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
F	fahrenheit
ft	feet
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
IEEE	Institute of Electrical and Electronics Engineers
IO	isolated occurrence
IP	individual permit
IRP	Integrated Resource Plan
JD	jurisdictional determination
kV	kilovolt
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
msl	mean sea level

Acronym	**Definition**
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAWQA	National Water Quality Assessment
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NOR	notice of registration
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register for Historic Places
NWI	National Wetlands Inventory
NWP	nationwide permit
O&M	operation and maintenance
O_3	ozone
OPGW	fiber-optic overhead groundwire
OSHA	Occupational Safety and Health Administration
OWR	Office of Water Resources
Pb	lead
PCS	power conversion station
PEL	permissible exposure limit
PGA	peak ground acceleration
PM	particulate matter
PM_{10}	particulate matter whose particles are less than or equal to 10 micrometers
$PM_{2.5}$	particulate matter whose particles are less than or equal to 2.5 micrometers
PPA	power purchase agreement
PPE	personal protective equipment
PS	partial status
PV	photovoltaic
QCI	Qualified Credentialed Inspector
QCP	Qualified Credentialed Professional
RAM	Rapid Assessment Method
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
RO	reverse osmosis
ROW	right-of-way
SAR	sensitive area resource
SHPO	State Historical Preservation Office
SMZ	streamside management zone
SO_2	sulfur dioxide
SP	state protected
SPCC	Spill Prevention, Control, and Countermeasure
STEL	short-term exposure limit
T&E	threatened and endangered
TLV	threshold limit value
TVA	Tennessee Valley Authority

Acronym	**Definition**
TVAR	Tennessee Valley Archaeology Research
TWA	time weighted average
U.S.C.	United States Code
US	United States
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
WWC	wet weather conveyance
yr	year

CHAPTER 1

1.0 INTRODUCTION

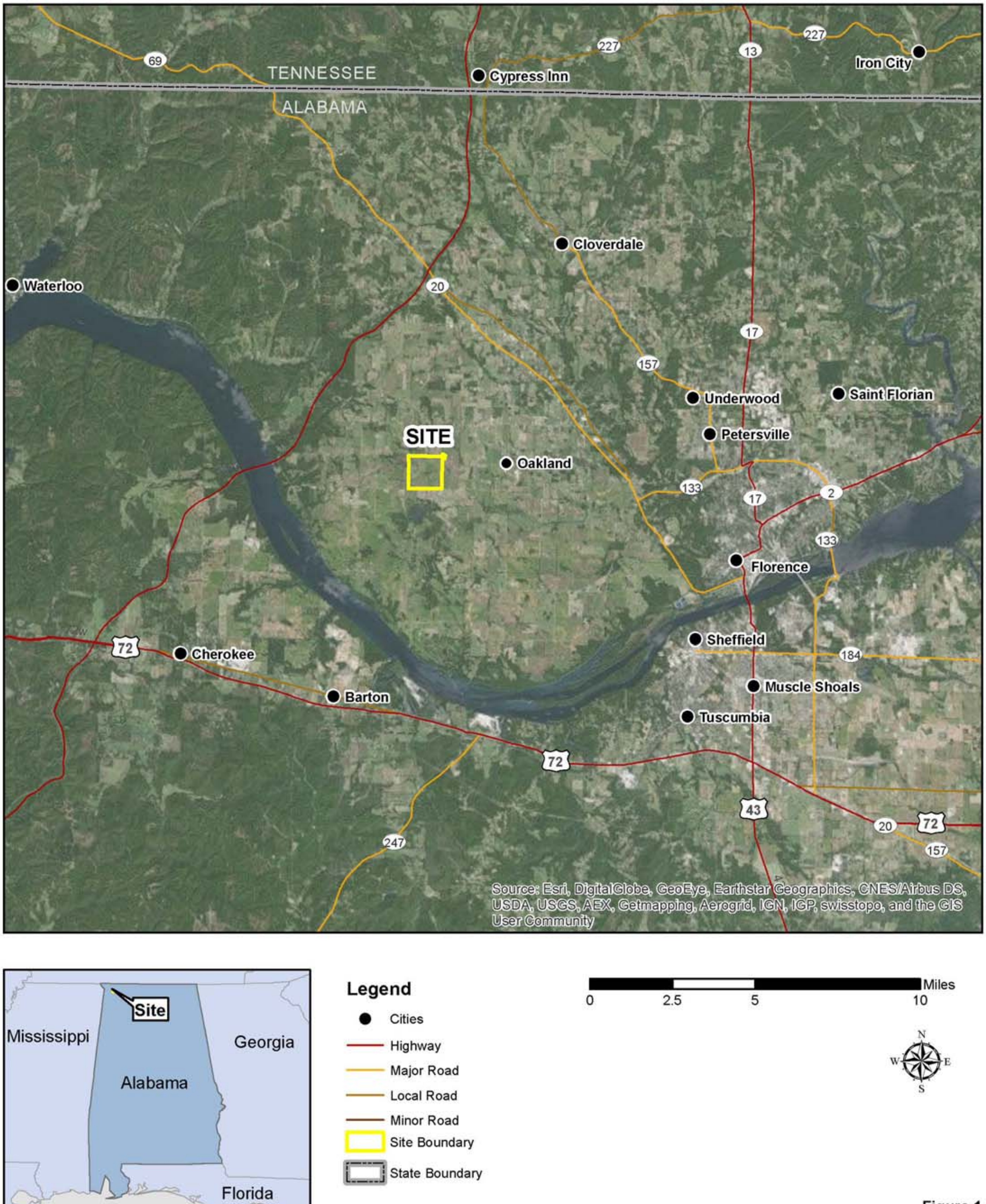
The Tennessee Valley Authority (TVA) proposes to purchase the power generated by the proposed up to 80-megawatt (MW) alternating current (AC) River Bend Solar Project (“Project”) in Lauderdale County, Alabama. The proposed solar facility would be constructed and operated by River Bend Solar, LLC (River Bend), a subsidiary of NextEra Energy Resources, LLC. Under the terms of the conditional Power Purchase Agreement (PPA) approved by TVA in February 2015, TVA would purchase the electricity generated by the proposed solar facility for 20 years.

The River Bend Solar project would occupy approximately 645 acres, five miles west-northwest of Florence, Alabama (Figure 1). The solar generating facility would consist of multiple parallel rows of photovoltaic (PV) panels on single-axis tracking structures, direct current (DC) to AC inverters, and transformers. The facility would be connected to TVA’s existing Colbert Fossil Plant-Selmer 161-kilovolt (kV) transmission line adjacent to the Project Area.

TVA was established by an act of Congress in 1933 to address a wide range of environmental, economic, and technological issues including delivery of low-cost electricity and management of natural resources. TVA operates the largest public power system in the United States (US) and supplies power to a population of over nine million people located across 80,000 square miles in most of the State of Tennessee and parts of Alabama, Georgia, Kentucky, Mississippi, North Carolina and Virginia through sales to 155 local power companies and 59 large industrial and federal facilities.

TVA produces or obtains electricity from a diverse portfolio of energy sources including solar, hydroelectric, wind, biomass, fossil, and nuclear. In 2011, TVA completed an Integrated Resource Plan (IRP) and associated Environmental Impact Statement (EIS) (TVA 2011). The IRP identifies the resources that TVA uses to meet the energy needs of the TVA region over the 20-year planning period while meeting TVA’s vision to become one of the Nation’s leading providers of low-cost and cleaner energy by 2020. Cost-effective renewable energy, including energy generated by solar PV, is one of the energy resources recommended in the IRP. Since 2011, TVA has undertaken several efforts to expand the contribution of renewable energy in its generation portfolio. The River Bend Solar project would provide cost-effective renewable energy consistent with TVA goals.

In July 2015, TVA issued an updated final IRP and associated final supplemental EIS (TVA 2015a). The proposed PPA with River Bend Solar is consistent with the alternative strategies evaluated and the recommendation in the final 2015 IRP.



Source: ArcGIS Aerial Map

Figure 1
Site Location Map

1.1 PURPOSE AND NEED FOR ACTION

As of September 30, 2014, the TVA power system had a dependable summer generating capacity of about 37,000 MW. The majority of this power is generated from a combination of nuclear, coal-fired, combined and simple-cycle gas-fired, hydroelectric, and pumped storage facilities; additional sources include wind, solar, and methane-fueled generation. Like many utilities, TVA has power interchange agreements with utilities throughout the service area. The 2011 IRP analyzed baseline peak load and net system energy requirement growth at average annual rates of 1.3 percent and 1.0 percent, respectively (TVA 2011). This projected demand would likely exceed the currently available and future planned generating resource capabilities resulting in capacity and energy gaps. The power supply plan adopted by TVA in the IRP projected that a portion of this need for additional energy resources would be met by renewable energy generated in the TVA service area. While more recent forecasts have shown reduced demand growth (TVA 2015a), TVA remains committed to maintaining a diverse energy resource portfolio while increasing generation by cleaner and low-carbon-dioxide emitting resources. The Proposed Action, entering into the PPA with River Bend, LLC, would help to meet this need.

1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and the Act's implementing regulations promulgated by the Council on Environmental Quality ([CEQ]; 40 Code of Federal Regulations [CFR] 1500-1508), federal agencies are required to evaluate the potential environmental impacts of their proposed actions. This environmental assessment (EA) was prepared to assess the potential consequences of TVA's Proposed Action (the purchase of power under the PPA) on the environment in accordance with NEPA and TVA's procedures for implementing NEPA (TVA 1983).

TVA's Proposed Action would result in the construction and operation of the proposed solar facility by River Bend, as well as actions taken by TVA to connect the solar facility to the TVA transmission system. The scope of this EA therefore focuses on impacts related to the construction and operation of the proposed solar facility and associated modifications to the TVA transmission system.

This EA (1) describes the existing environment at the project site, (2) analyzes potential environmental impacts associated with the Proposed Action and the No Action Alternative, and (3) identifies and characterizes cumulative impacts that could result from the proposed project in relation to other ongoing or reasonably foreseeable proposed activities within the surrounding area of the project site.

Under the PPA, TVA's obligation to purchase renewable power is contingent upon the satisfactory conclusion of the environmental review and TVA's determination that the action will be "environmentally acceptable." To determine acceptability, TVA must take into account applicable federal laws and regulations and conclude that no significant impacts to the environment or human health would result from the location, operation, and/or maintenance of the proposed project and/or associated facilities, and that the project would be consistent with the purposes, provisions, and requirements of all applicable federal, state, and local environmental laws and regulations.

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

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

- **Chapter 1.0:** Describes the purpose and need for the project, the decision to be made, related environmental reviews and consultation requirements, necessary permits or licenses, and the EA overview.
- **Chapter 2.0:** Describes the Proposed Action and No Action alternatives, provides a comparison of alternatives, and discusses the Preferred Alternative.
- **Chapter 3.0:** Discusses the affected environment and the potential direct and indirect impacts on these resource areas. Mitigation measures are also proposed, as appropriate.
- **Chapter 4.0:** Discusses the cumulative impacts in relation to other ongoing or reasonably foreseeable proposed activities within the surrounding area of the project site.
- **Chapters 5.0 and 6.0:** contain the List of Preparers of this EA, and the Literature Cited in preparation of this EA, respectively.
- **Appendix A:** TVA ROW Clearing Specifications
- **Appendix B:** TVA Environmental Quality Protection Specifications for Transmission Line Construction
- **Appendix C:** TVA Transmission Construction Guidelines near Streams
- **Appendix D:** TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction
- **Appendix E:** TVA ROW Vegetation Management Guidelines 2013
- **Appendix F:** Environmental Investigation Report (Wetlands and Protected Species)
- **Appendix G:** Consultation Information

1.3 PUBLIC INVOLVEMENT

Copies of the Draft EA were mailed to government agencies, as well as individuals who indicated an interest in the project. TVA notified interested federally recognized Native American Tribes, elected officials, and other stakeholders that the Draft EA was available for review and comment for a 30-day period. An electronic version of the document was posted on the TVA website where comments could also be submitted online. Public notices were published in local newspapers soliciting comments from other agencies, the general public, and any interested organizations. Agencies and organizations that received notice of availability and/or printed copies of the Draft EA included:

- Alabama Department of Environmental Management (ADEM)
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Agriculture and Industries
- Alabama Department of Economic and Community Affairs
- Shoals Economic Development Authority
- Northwest Alabama Council of Local Governments
- U.S. Fish and Wildlife Service (USFWS)
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
- US Army Corps of Engineers (USACE)
- Southern Environmental Law Center
- Southern Alliance for Clean Energy
- Sierra Club
- Alabama Center for Sustainable Energy
- Alabama Environmental Council

The Draft EA public comment period began on August 12, 2015 and ended on September 14, 2015. TVA received a total of 10 comment letters, nine of which were in support of the project. Many of the letters specifically highlighted the benefits of renewable energy sources, TVA's green energy incentive programs, and the project's contribution to sustainable energy in the Southeast. No comments in opposition of the project were received.

The other comment letter which was received requested information on cultural resource surveys and recommendations. The project site was surveyed from November 12–24, 2014; results of these surveys are presented in Section 3.8.1.3, and potential impacts to cultural resources are discussed below in Section 3.8.2. As documented in Appendix I of the Draft EA (Appendix G of this Final EA), the Alabama State Historic Preservation Office concurred with TVA's recommendation that the Proposed Action would not affect historic properties in a letter dated June 18, 2015.

A joint support letter was received from the Southern Alliance for Clean Energy and the Sierra Club. Specifically, their comments highlighted the beneficial use of PV solar technology, the suitability of the project location and characteristics of the project site, and the lack of significant impacts expected to occur as a result of the project.

The Southern Environmental Law Center on behalf of itself and the Alabama Environmental Council submitted a supportive letter that included a request for clarification in regards to wetlands, groundwater, and climate change impacts. Further detail on these resource impacts has been provided in this Final EA in Section 3.3.2.2 Water Resources impacts, Section 2.2.2 Construction, and Section 3.7.2.2 Climate Change impacts, respectively.

1.4 REQUIRED PERMITS AND LICENSES

1.4.1 Solar Facility

An Alabama Construction General Permit (National Pollutant Discharge Elimination System [NPDES] Permit No. ALR100000) would be required for the construction on the 645-acre River Bend solar site. NPDES Permit No. ALR100000 is a general permit authorizing discharges associated with construction activities that result in a total land disturbance of 1 acre or greater, and sites less than 1 acre but part of a larger common plan, development or sale. Construction-site operators/owners seeking coverage under this general permit must submit a Notice of Intent (NOI) and Notice of Registration (NOR) in accordance with the permit requirements prior to any construction activities. The NOI and NOR establishes permittee information, facility information, total acreage of the site, total acreage of disturbed area, and receiving waters for the stormwater discharge points. Information listed in the NOI must be certified by a Qualified Credentialed Professional (QCP) in the State of Alabama. Once the NOI has been submitted to ADEM and approved, ADEM will issue an authorization number that must be displayed at the facility.

In conjunction with erosion and sediment control plans that are required for the Construction General Permit, a Construction Best Management Practices Plan (CBMPP) is required by the ADEM as a means to gather and communicate environmental commitments and contractor requirements related to erosion and sediment control. The design components of the CBMPP (i.e., erosion and sediment control plans) must be certified by a QCP in the State of Alabama prior to any construction activities. During construction, application and implementation of Best Management Practices (BMPs) related to the erosion and sediment control plan must be inspected by a Qualified Credentialed Inspector (QCI) in the State of Alabama and recorded in the CBMPP.

On September 14, 2015, River Bend submitted a NOI and Preliminary CBMPP, and in a letter dated September 23, 2015, ADEM granted General NPDES Permit Number ALR10B309.

A list of anticipated permits and licenses required for the Project is presented in Table 1.4-1.

Table 1.4-1. River Bend Solar Permit and Approval List

Permit/Approval	Associated Documentation	Lead Agency
Federal Permits & Approvals		
If streams and wetlands cannot be avoided, the following federal permits maybe required:		
Section 404 Nationwide Permit (NWP), if jurisdictional features are impacted *Individual Permit (IP), if threshold impacts exceeded (0.5 acres or 300 linear feet of stream).*	Wetland delineation, jurisdictional determination	USACE - Nashville District Western Regulatory Branch
Endangered Species Act Section 7 consultation (if necessary)	Biological resources survey results, biological assessment	USFWS
State Permits & Approvals		
§106 National Historical Preservation Act consultation	Cultural resources survey results	Alabama State Historic Preservation Officer (SHPO)
Alabama General Construction Permit (ALR100000)	Construction-site Erosion Prevention and Sediment Control (EPSC) plans	ADEM
Construction Best Management Practices Plan (CBMPP)	Along with the necessary application fees, project drawings, including plan view and cross sections	ADEM
State Wildlife Coordination	Biological resources survey results	Alabama Division of Wildlife and Freshwater Fisheries
Surface Water Withdrawal Permit (if necessary, and only if capacity to withdraw is 100,000 gallons per day or more)	OWR requires registration of facility and Certificate of Use to be obtained	Alabama Department of Economic and Community Affairs (ADECA) Office of Water Resources (OWR)
Groundwater Withdrawal Permit (if necessary, and only if capacity to withdraw is 100,000 gallons per day or more)	OWR requires registration of facility and Certificate of Use to be obtained	ADECA-OWR

1.4.2 Transmission Interconnection

An Alabama Construction General Permit (NPDES Permit No. ALR100000) would be required for the construction of the associated transmission connection. Permitting and licensing requirements would be reviewed on a site-specific basis after further study confirms the specific upgrades necessary or where the transmission connection would be located. Generally, however, a permit would be required from the state of Alabama and the applicable county and/or municipality for the discharge of construction-site stormwater associated with the construction of the transmission line. TVA would prepare the required erosion and sedimentation control plans and coordinate them with the appropriate state and local authorities. A permit may also be required for burning trees and other combustible materials removed during transmission line construction. A Section 404 Nationwide or Individual Permit would be obtained from the USACE for the discharge of dredge or fill into waters of the United States, if applicable.

CHAPTER 2

2.0 DESCRIPTION OF THE PROPOSED SOLAR PROJECT AND ALTERNATIVES

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

2.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, TVA would not purchase the power generated by the project under the 20-year PPA with River Bend (i.e., TVA would not be involved with the project). If TVA were to select this alternative, and River Bend elected not to proceed with the project, then River Bend would not construct the facility on the currently farmed tract of land in Lauderdale County, Alabama and TVA would not make the associated modifications to its transmission system. River Bend would not complete the purchase of the property. Existing conditions would remain unchanged (i.e., property would remain as predominantly-disturbed agricultural land) and agricultural activities would likely continue. TVA would continue to rely on other sources of generation described in the 2015 IRP (TVA 2015a) to ensure an adequate energy supply and to meet its goals for increased renewable and low greenhouse gas (GHG)-emitting generation.

There would be no project-related changes to land use, natural resources, or socioeconomics in the immediate future.

2.2 PROPOSED ACTION

Under the Proposed Action, River Bend would construct, operate, and maintain a single-axis tracking photovoltaic (PV) solar power facility, of up to 80-MW AC generating capacity, and the energy generated by the proposed facility would be sold to TVA under a 20-year PPA. The facility would be located on approximately 645 acres of a currently farmed tract of land in Lauderdale County, Alabama, approximately 5 miles west of the City of Florence, Alabama (Figure 1). The project would interconnect to TVA's Colbert Fossil Plant-Selmer 161-kV transmission line, which passes by the northeast corner of the power facility site. TVA would construct a short (less than 1,000 feet [ft]) transmission line between the existing line and the Project substation. Under NEPA, TVA considers the Proposed Action to consist of both the purchase of renewable energy under the PPA, and the construction and operation of the proposed project. Because execution of the PPA is a contractual rather than physical action, the scope of environmental consequences evaluated in this EA for the Proposed Action focuses on impacts related to the construction and operation of the project.

2.2.1 Project Description

The project area consists of an approximately 645-acre tract of farmland located in unincorporated Lauderdale County, Alabama (Figure 1), and approximately 5 miles west of the

City of Florence, Alabama. River Bend currently holds a purchase option for the acquisition of the property, which is privately-owned. Within this 645-acre project area, an additional easement totaling approximately 5 acres located in the northeast corner of the project area would be utilized for transmission interconnection (i.e., additional transmission structures required to connect to the existing TVA transmission line; Figure 2).

The solar arrays utilized for the proposed facility would be composed of multiple polycrystalline PV modules or panels. This action would also include a small on-site substation, as well as an Operations and Maintenance (O&M) Building. A proposed TVA 161-kV transmission line would be constructed to connect the on-site substation and solar array to the point of interconnect to the TVA 161-kV Colbert Fossil Plant-Selmer transmission line (Figures 2 and 3).

PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current is produced, which can be used as electricity. This project would convert sunlight into DC electrical energy within polycrystalline PV modules (Photo 2.2-1). The PV modules are each capable of producing approximately 330 watts, and would be mounted together in arrays. These arrays would be grouped into individual blocks with an output of approximately 4.0 MVA AC. Each block would consist of PV modules configured into arrays and a power conversion station (PCS) that includes inverters and transformers to convert the DC electricity generated by the solar panels into AC electricity for transmission across the project's electrical collection system and to the on-site substation.

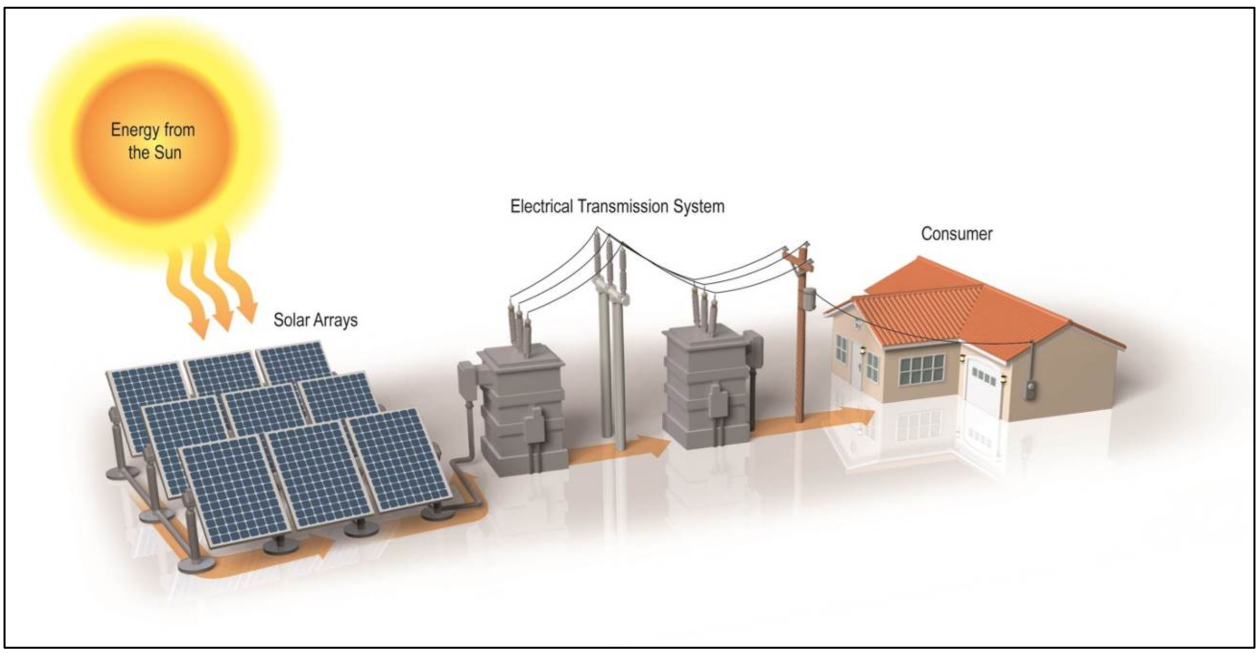
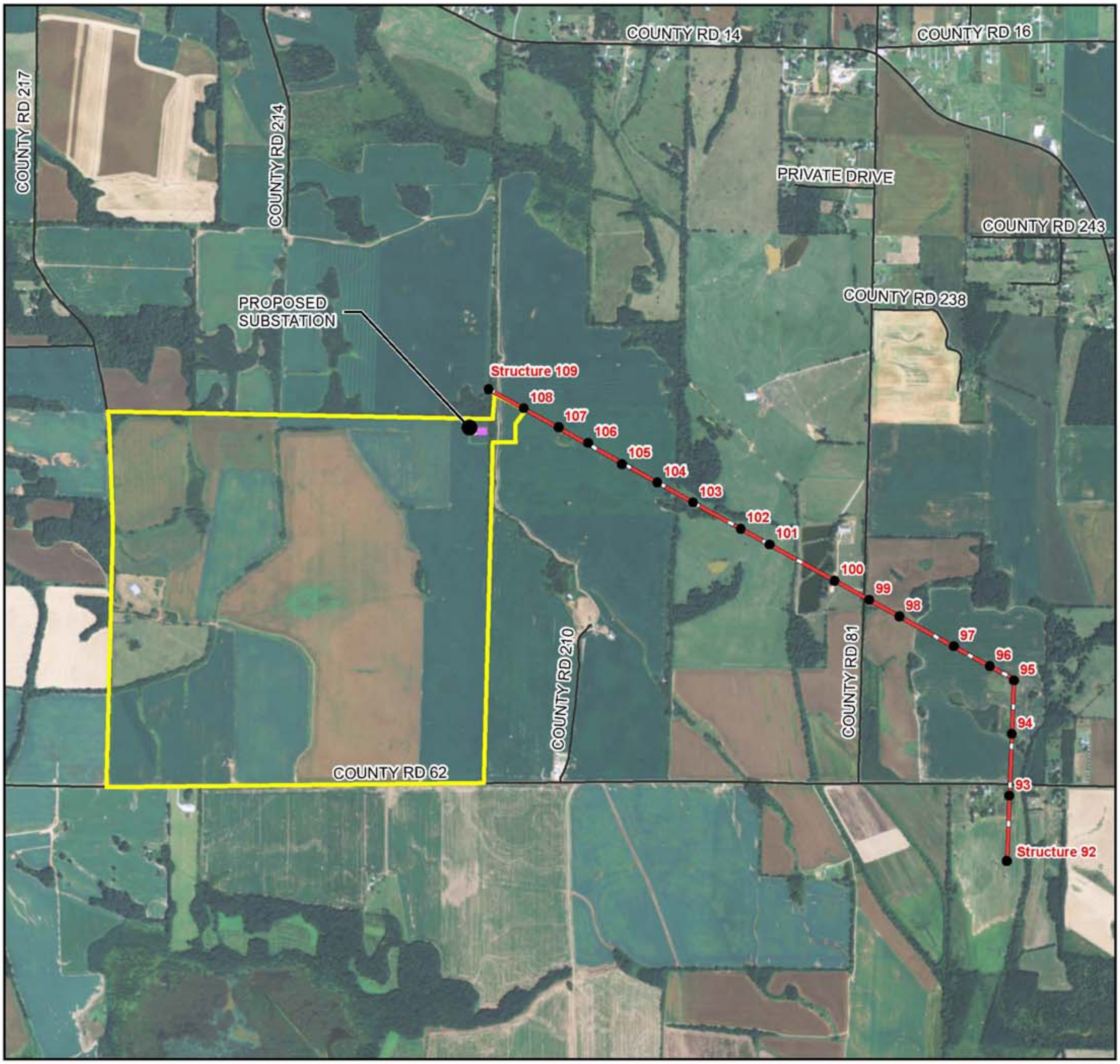


Photo 2.2-1. General Energy Flow Diagram of PV Solar System



Source: ArcGIS Aerial Map

Figure 2
Site Aerial Map

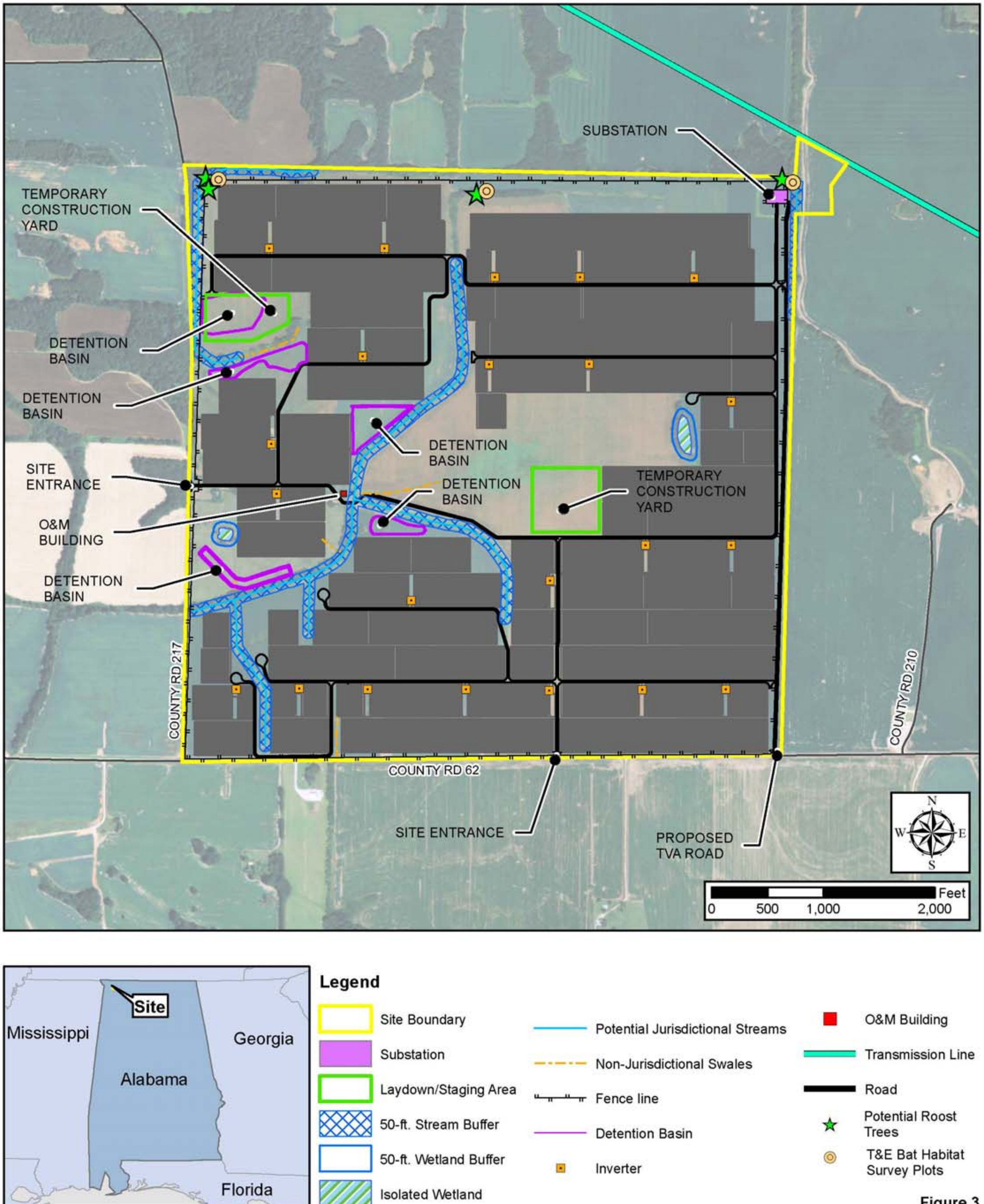


Figure 3
Site Layout Map

Source: ArcGIS Aerial Map

The PV panels would be mounted on a motor-operated axis tracker structure, commonly referred to as a single-axis tracker. The axis tracker would be designed to follow the path of the sun from the east to the west across the sky. The tracker assemblies would be constructed in parallel north-south rows using steel piles installed using either a pile driver or helical piles with an approximate depth of 6 to 10 feet below grade (Photo 2.2-2).

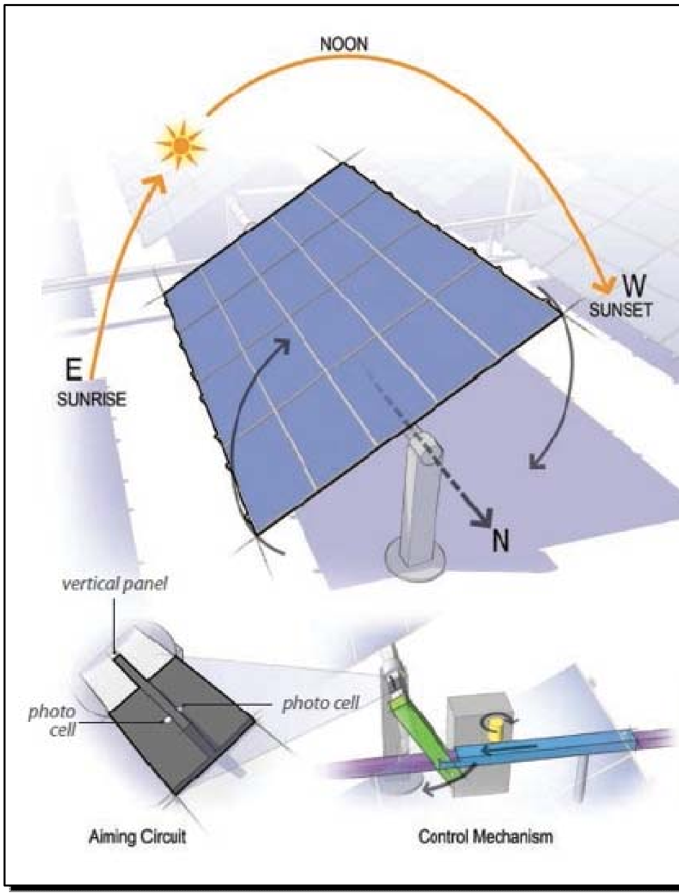


Photo 2.2-2. Diagram of Single-Axis Tracking System

The PV modules would be electrically connected in series (called a "string") by wire harnesses that conduct DC electricity to combiner boxes. Each combiner box would collect power from several strings of modules and feed a PCS via cables placed in excavated trenches. The trenches would be approximately 3 ft deep and one to 4 ft wide. The bottom of each trench would be lined with clean fill to surround the DC cables, and the remainder of the trench would be back-filled with native soil and then appropriately compacted.

Each PCS consists of a unit containing several power inverter units connected to the adjacent transformers and mounted on concrete pads or piers. The PCS packages would be approximately 8 to 10 ft tall and approximately 40 ft long and the transformer enclosure would be approximately 6.5 ft tall. The inverters change the DC output from the combiner boxes into AC electricity. The resulting AC current from each individual PCS would then be transformed at the adjacent pad-mounted transformers into the AC collection voltage, typically 34.5 kV. The underground medium voltage collection circuits would deliver AC electricity from the PCS units to the project's on-site substation. Nearly all of the AC collection system would be installed underground.

2.2.2 Construction

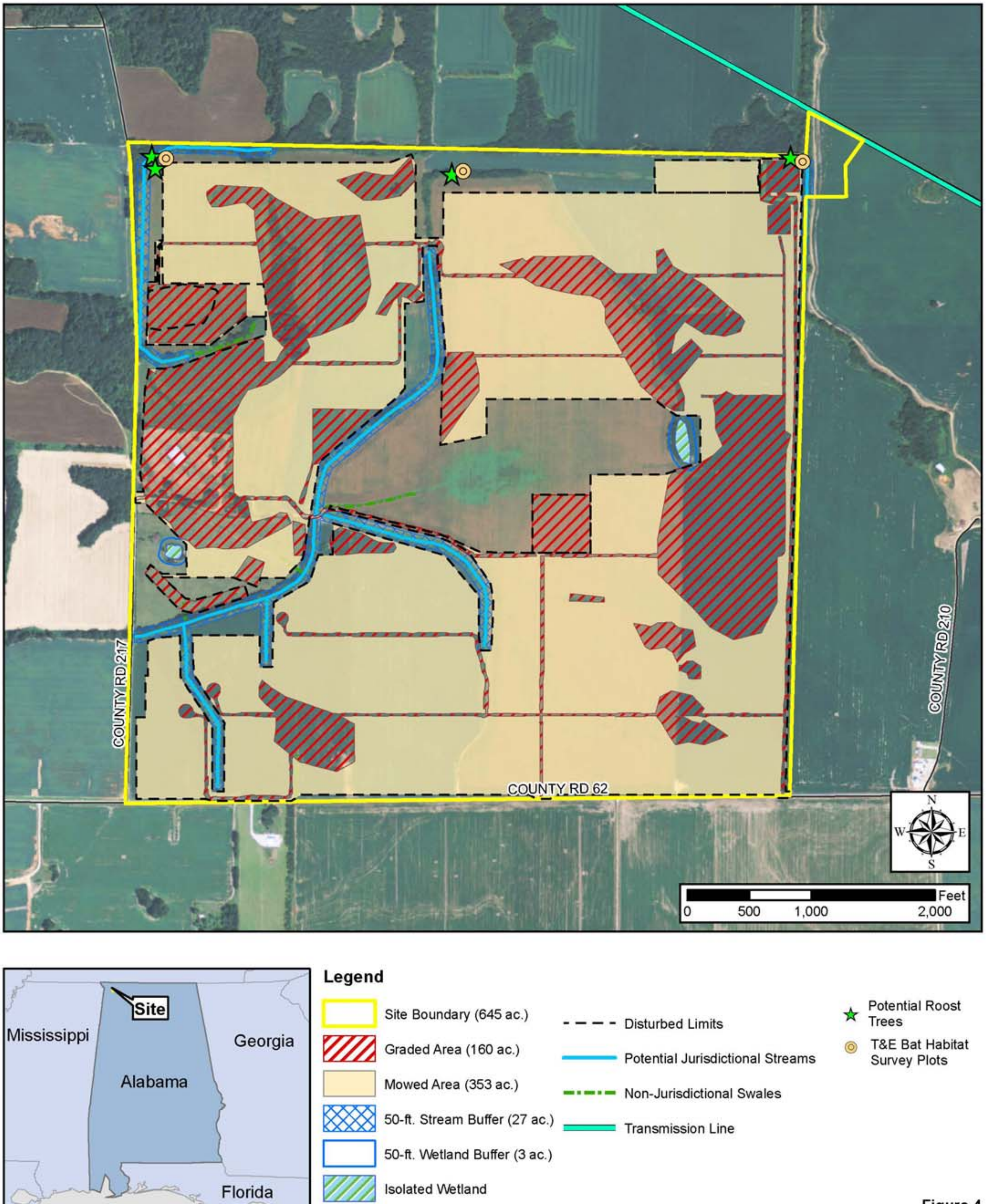
Construction of the solar power facility generally requires site preparation (surveying and staking, removal of tall vegetation, grading, clearing and grubbing, installation of a perimeter security fence and area lighting, and preparation of construction laydown areas) prior to solar array assembly and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

River Bend's standard practice is to work with the existing landscape (e.g., slope, drainage, utilization of existing roads) where feasible and minimize or eliminate grading work to the extent possible. Any required grading activities would be performed with portable earthmoving equipment and would result in a relatively consistent slope to local land areas. 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 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 good mixture of certified weed-free, low-growing native grass seed. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the pre-construction conditions or the site is stable.

Grading would consist of the excavation and compaction of earth to meet the final design requirements. Due to the existing topography of the site and the use of single-axis tracking, cut and fill grading activities would be required to achieve the final design and maximum slope criteria. Grading could include stripping, cutting, filling, stockpiling, or any combination thereof. Grading activities at the site are expected to result in a net zero balanced cut and fill quantity of earthwork to the extent practical and therefore not require any off-site or on-site hauling. Clearing and grubbing could include the removal of trees, shrubs, and vegetation.

A preliminary grading plan (Figure 4) shows that approximately 160 acres of the project site would require grading, and approximately 353 acres would require mowing, which would include light surface preparation and some clearing/grubbing. The mowing and light surface preparation would be similar in nature to that of the previous on-site agricultural activities. Where necessary, tall vegetation would be removed from both graded and the mowed areas to reduce shading and maximize power production. Buffers of 50 ft would be maintained along each side of delineated wetlands and streams (100 ft total width) as a conservative avoidance measure. These areas would be avoided during construction to the greatest extent feasible, although some work could be expected to occur within the buffer zones. Once areas to be avoided are marked, construction areas would be cleared and mowed of vegetation and miscellaneous debris. Ongoing mowing and clearing operations would continue as needed, to control vegetation growth during construction (Figure 4).

On-site stormwater detention basins would be constructed in appropriately designed locations within the Project Site. The design of these basins would be based on the most recent hydrology study and would temporarily store stormwater, minimize erosion, and reduce the rate of runoff. The ponds would be constructed either by impoundment of a natural depression(s) or by excavating the existing soil. The bottom elevation and embankments of the ponds would be allowed to naturally reestablish native vegetation after construction (or be replanted as necessary) to provide natural stabilization, minimizing subsequent erosion. Water from the ponds would be released through specially designed outlet or discharge structures, which control the rate of outflow.



Source: ArcGIS Aerial Map

Figure 4
Preliminary Site Grading Plan

Water would be needed for soil compaction and dust control during construction and for domestic use during operations. Due to the temporary nature of water needed for construction, trucking in or utilizing groundwater for construction usage are the preferred approaches. The distance to the nearest existing water main (almost three miles) would result in linear disturbance to pipe water to the project site for this short-term need. Trucking water from this location may also be used, but as it would result in additional traffic impacts and cost, on-site groundwater production remains the preferred choice. In the event that on-site sewage is generated, wastewater would be retained in a septic holding tank for periodic pump out. Based on a recent soils investigation, a leach field system has been determined to not be a viable option. Containment in a tank would minimize the potential for any impact to local groundwater. In addition installation of a municipal sewer line would result in a linear disturbance similar to that discussed above for a water supply line and would likely require a pressurized line, which would increase the potential for contamination. Portable toilets would be available on-site for the duration of the construction period.

Water in sufficient quantity and quality is expected to be made available for this project in one of two ways, 1) through use of on-site groundwater wells, or 2) delivery via water trucks. Water could be supplied by pumping groundwater from wells to be installed on the Project Site. Between two to four on-site groundwater supply wells would be utilized for the Project (depending on flow capacity of each well). If wells are needed, their exact location would be identified in the final design. The wells would be spaced around the site to provide easy access for construction water and to reduce the potential for any significant water level drawdown. If determined necessary, one of these wells would be installed near the O&M building for use during the operations phase. The well field would include a sufficient number of standby wells to provide water in the event the primary well(s) is shut down for maintenance.

Water quality is expected to be unsuitable for potable use without disinfection at a minimum, and a potable water treatment system would need to be installed unless potable water is brought in from an off-site source for domestic use. River Bend may do some groundwater drilling and testing work prior to full construction in order to gather information on aquifer characteristics and to better develop a plan for the production well design.

Construction of production wells would consist of conventional well drilling techniques. A truck mounted drilling rig would set up at the identified location. No permanent drilling pad would be constructed, although gravel in the area would likely be used to temporarily stabilize the surface. Water based drilling muds (if required) would be collected and dewatered, with runoff occurring locally into nearby field areas. Dewatered muds would be non-toxic so they can be spread as subsoil as part of the site grading. Well construction would take place using power from the drilling truck, and a portable generator would be used for initial well testing and construction production. Well production during operation would be powered with electric motors off of the Project distribution power system.

Temporary construction yards (Figure 3) would be utilized during construction for job office trailers, equipment storage, material storage, and employee parking. The construction yards will be built shortly after site access is granted to begin construction and would be utilized throughout the construction period. Once all project equipment and materials have been installed, the construction yards will be reclaimed and the northwestern-most detention basin would be built prior to contractor de-mobilization (Figure 3).

Construction of the tracker assemblies may be conducted in a temporary building on-site at the construction laydown area, transported via truck to the proper location, and placed on the pre-installed supports. Alternatively, the array assembly could occur adjacent to the installation point. Final assembly typically involves tractors and forklifts to place the trackers onto the support structures. The tracker assemblies would be arranged in parallel north-south rows. During this work, multiple crews and vehicles would be working on the solar facility, including flatbed trucks for transporting the arrays. Array construction vehicles would include pick-up trucks to transport materials and workers on access roads and array aisles. Access roads are typically 20 feet wide or less consisting of 12” of compacted native subgrade material and surfaced with 6” of compacted gravel. Access roads are graded to slope to existing ground conditions which allow for proper drainage.

Depending on the final PV technology and vendor selected, the design of the tracker support structures could vary. Typical installations of this type are constructed using steel piles. The driven steel pile foundation is typically galvanized and used where high load bearing capacities are required. The pile is driven with either a hydraulic ram or vibratory action. 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. Once the majority of the components are placed on their respective foundations and structures, electricians and helpers would run the electrical cabling throughout the solar field.

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

The proposed project would also include a small substation. Transmission system/electrical interconnection details are provided in Section 2.2.3 below.

The O&M building would be single-story approximately 2,500-SF structure designed in accordance with all applicable permits and local ordinances. The building would be equipped with men’s and women’s restrooms, a kitchen area, two offices, a communication room (to house telephone equipment, IT equipment, etc.), a technical work area and a work space area. The work space area shall be provided with an overhead door. The building would be provided with heating and air conditioning (including work area), wired for phone and IT infrastructure, potable water and sanitary waste disposal, and a parking lot for eight vehicles.

Approximately 620 acres of the Project Area would be securely fenced during construction and for the duration of the Project operation (Figure 3). Construction activities for the facility would take approximately 12 months to complete using a crew that ranges from 30 to 162 workers. Work would generally occur Monday through Friday from 7 am to 7 pm. Additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities. During the project startup phase, equipment and system testing and similar activities could continue 24 hours per day, 7 days a week.

2.2.3 Electrical Interconnection

Under the Proposed Action, TVA would construct a short 161-kV transmission line to connect the River Bend Solar facility to TVA's nearby Colbert Fossil Plant-Selmer 161-kV transmission line. While the exact location of the transmission line route has not yet been determined, it would connect the River Bend Solar 161-kV substation in the north-eastern corner of the 645-acre site to the Colbert Fossil Plant-Selmer line between structures 108 and 109. This section of the Colbert Fossil Plant-Selmer line is adjacent to the northeast border of the River Bend site as illustrated in Figure 2. The new line would be between 700 and 1,300 feet in length and would be constructed on a 100-foot wide right-of-way (ROW).

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

- Installation of fiber-optic overhead groundwire (OPGW) on about 2 miles of the Colbert Fossil Plant-Selmer transmission line from the River Bend Solar interconnection east and south to structure 92 located about 0.25 miles south of CR 62;
- Installation of telecommunications connections at the Selmer Tennessee substation and Colbert Fossil Plant and Wilson Hydro Plant 161-kV switchyards; and
- Modification of TVA system map boards to include names and numbers of the new transmission line and River Bend Solar Substation.

2.2.3.1 Right-of-Way Acquisition and Clearing

TVA typically purchases easements for new transmission line ROWs from landowners; these easements give TVA the right to construct, operate, and maintain the transmission line, as well as remove "danger trees" adjacent to the ROW. Danger trees include any trees that are located beyond the cleared ROW, but that are tall enough to potentially impact a transmission line structure or conductor, should the trees fall toward the transmission line. The fee simple ownership of the land within the ROW would remain with the landowner, and many activities and land uses could continue to occur on the property. However, the terms of the easement agreement prohibit certain activities, such as construction of buildings and any other activities within the ROW that could interfere with the transmission line or create a hazardous situation.

Because the area in which the proposed transmission line would be built is predominantly cropland, limited clearing would be required. In areas where clearing is needed to maintain adequate clearance between tall vegetation and transmission line conductors and to provide access for construction equipment, trees and shrubs would be removed from the ROW. Equipment used during this ROW clearing could include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Woody debris and other vegetation would be piled and burned, chipped, or taken off-site. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote-handling equipment, such as a feller-buncher, in order to limit ground disturbance. TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, Transmission Construction Guidelines Near Streams (Appendices A, B and C), and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012) would provide guidance for clearing and construction activities.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable, utilizing appropriate seed mixtures as described in Muncy (2012), or in working with the property owner to establish desired crop cover. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in Appendices A, B and C, and in Muncy (2012). Native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

2.2.3.2 Transmission Line Construction

Transmission-related project features would be accessed using existing access roads to the extent possible Access roads would be needed to allow vehicular access to each structure and other points along the ROW during construction. Typically, temporary access roads used for transmission lines are located on the ROW wherever possible, and are designed to avoid severe slope conditions and to minimize stream crossings. Permanent access will be required to the switch structures just outside the River Bend Solar Site. Access roads are typically about 20 feet wide and are surfaced with dirt, mulch, or gravel. Culverts and other drainage devices, fences, and gates are installed as necessary. Culverts may be left or removed, depending on the wishes of the landowner or applicable permit conditions. If desired by the property owner, TVA would restore new temporary access roads to previous conditions.

A construction assembly area (laydown area) would be required for worker assembly, vehicle parking, and material storage during construction. This area would be on the River Bend Solar site, if available, or leased from a private landowner for the duration of the construction period. Trailers used for material storage and office space would be parked on the site. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of TVA-installed fencing and site restoration would be performed by TVA at the discretion of the landowner.

Switch structures and a 3-pole transmission structure (Photo 2.2-3) would be installed at the junction of the new line and the Colbert Fossil Plant-Selmer line. At least one other 3-pole structure similar to the structure illustrated in Photo 2.2-3 would be installed along the remainder of the new line. The switch structures would be lattice-steel structures between 30 and 40 feet tall and the 3-pole structures would be between 80 and 120 feet tall. Three conductors (the cables that carry the electrical current) are required to make up a single-circuit alternating-current transmission line. Each conductor would be attached to a porcelain insulator suspended from the structure cross arm. A smaller overhead ground wire containing fiber optic communication cables would be attached to the top of the structures.

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

Photo 2.2-3. Example of switch structures and associated 3-pole transmission structure at a transmission line tap point

Equipment used during the construction phase would include trucks, truck-mounted augers, and drills, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations (such as areas with soft ground) to reduce the potential for environmental impacts.

Reels of conductor and OPGW would be delivered to the site. A small rope would be pulled from structure to structure. It would be connected to the conductor and used to pull it down the line through pulleys suspended from the insulators from pull-points along the ROW. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys. The OPGW would be installed in a similar manner. Prior to installing the OPGW, the existing steel groundwire would be unclipped from the structures and removed using a pulley system from pull points along the ROW. The OPGW would be spliced to existing communication lines at each end of its span.

2.2.3.3 Substation Construction

The Proposed Action includes an on-site substation that combines all the AC power from the collection circuits and increases its voltage to match the voltage of the connecting transmission line. This substation, which would include buses, circuit breakers, disconnect switches, and the main step-up transformer, would be located in the northeast corner of the project area.

The on-site substation would occupy approximately 1 acre (Figure 3) and would consist of a 34.5/161-kV main transformer, multiple 161-kV and multiple 34.5-kV breakers, motor-operated and manually operated switches, a control enclosure, instrument transformers for metering, and galvanized steel support structures within an 8-foot-tall fenced enclosure. The control enclosure would measure approximately 15 feet by 45 feet and would house the protection and control equipment, metering equipment, automation relay panels, and communication equipment.

Galvanized steel would support most of the substation equipment. Concrete foundations and embedments for equipment would be installed with trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. Above-ground and below-ground conduits from this equipment would run to the control enclosure. A station service transformer would be installed for auxiliary AC power requirements, such as operating the solar array tracker motors. Battery banks and chargers would be installed inside the enclosure to provide backup DC power. For personnel safety and equipment protection during faulted conditions, a ground grid would be installed in the area. This would consist of appropriately sized conductors meshed and buried below ground. Each piece of equipment and supporting structure within the substation would be electrically connected to the ground grid per the requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 80.

After the final voltage step-up, the project would be interconnected to the proposed 161-kV TVA transmission line to connect to the electrical system.

Substation lighting analysis would be done using Visual 2012 software with photometric data (IES) files provided by the manufacturer. The plan would utilize new LED flood light fixtures with various beam patterns to provide adequate site lighting within the fenced limits of the substation. The final aiming angles and orientation of the lights would be determined in the field by the contractor in the presence of the Site Engineer and/or Owner to maintain visual impacts within project boundaries. Lighting would be controlled by motion sensors or wind-down timers activated by personnel at the substation, and lights would normally remain off unless personnel were present. The light would be focused on areas of heavy traffic such as entrances, as well as major equipment for maintenance purposes. The plan would achieve a desired surface illuminance of 2.0 foot candles average. The lighting plan would minimize the number of poles added to the project by utilizing proposed substation structures for mounting, such as static masts. The mounting height of the lights would vary depending on the structure to be mounted on and the desired lighting levels as determined by the lighting analysis.

2.2.3.4 Transmission Line Operation and Maintenance

Periodic inspections of transmission lines are performed by helicopter aerial surveillance after operation begins. Foot patrols or climbing inspections are also performed in order to locate damaged conductors, insulators, or structures, and to discover any abnormal conditions that might hamper the normal operation of the line or adversely affect the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as immediately adjoining the ROW, is noted. These observations are then used to plan corrective maintenance and routine vegetation management.

TVA vegetation management standards, based on NESC requirements, require a minimum vegetation clearance of 24 feet for 161-kV transmission lines. Vegetation management along the ROW would consist of the felling of danger trees adjacent to the cleared ROW (as described above in the ROW Acquisition and Clearing Section) and vegetation control within the cleared ROW. These activities occur on approximately 3 to 5-year cycles. TVA utilizes an integrated management approach for its ROW vegetation management that is designed to encourage low-growing plant species and discourage tall-growing plant species. A vegetation reclearing plan is developed for the transmission line, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied by helicopter or from the ground with backpack sprayers or vehicle-mounted sprayers. Provided the current agricultural land use continues, little ROW maintenance would be required in the future.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the US Environmental Protection Agency (USEPA) are used. A list of the herbicides currently used by TVA in ROW management is presented in Appendix E. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Other than vegetation management, little maintenance work is generally required. The transmission line structures and other components typically last several decades.

2.2.4 Operations

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

Vegetation on the site would be actively maintained to control growth and prevent overshadowing or shading of the PV panels. River Bend would implement one of two potential methods of vegetation control during operations: 1) traditional mechanized landscaping using lawnmowers, weed eaters, etc.; and/or 2) sheep grazing. Traditional trimming and mowing would be performed on an interval basis to maintain the vegetation at a height of less than 2 feet. As an alternate method, grazing sheep could also be brought in for controlling weeds and grasses on the site. During operations, selective use of herbicides may also be employed around structures to control vegetation. Products used would be limited to post-emergent herbicides and would be applied by a professional contractor.

River Bend would have an O&M building on-site with up to three full-time employees. Those employees would typically work daytime hours Monday through Friday, with additional hours possible for unplanned maintenance work. All routine maintenance work listed above would normally take place during the weekday daytime hours, with work that might interfere with power production slipping into the early evening. Should a more complex repair or O&M activity be needed, such as an inverter module replacement, additional contract employees may be brought on-site to assist.

It may be necessary to periodically wash the solar modules. This work would take place primarily during early morning hours or late in the day, avoiding “peak” sun/heat hours to minimize impacts to generation, as well as minimizing rate of evaporation. A temporary crew of up to 12 people along with water trucks would be brought on-site. Purified water from an off-site source, without detergents or other additives, would be utilized and applied to modules by driving up and down the rows of modules. Module washing would take place no more than twice a year.

In addition to on-site personnel, the proposed project facility would be monitored remotely from the NextEra Juno Beach, Florida operational headquarters 24 hours a day, seven days a week to identify any security or operational issues. In the event a problem is discovered during non-working hours, a repair crew or law enforcement personnel would be contacted if an immediate response were warranted.

2.2.5 Decommissioning and Reclamation

The Project would operate and sell power under a PPA with TVA for the first 20 years of its life. At the end of the useful life, the Project staff and the parent company would assess whether to cease operations at the project site or to replace equipment and attempt to enter into a new power purchase contract or other arrangement. If TVA or another entity is willing to enter into such an agreement, the Project could continue operating. If no commercial arrangement is possible, then the facilities 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.

General decommissioning and reclamation activities are described below. Decommissioning activities would typically include:

- Dismantling and removal of all above ground equipment (solar panels, panel supports, transformers, Project Substations, O&M building, etc.)
- Removal of below ground electrical connections
- Removal of posts

- Break-up and removal of concrete pads and foundations
- Pumping and break-up of any septic tank (backfilled with clean soil)
- Abandonment of underground utilities
- Stabilization of site soils per NPDES permit
- Scarification of compacted areas within and contiguous to the solar facility

2.3 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

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

The alternative site screening process consisted of several iterations of refinement prior to arriving at the proposed site. Iteration one consisted of general solar resource screening within TVA's service area. In addition to solar resource screening, additional screening consisted of suitable large-scale landscape features that would allow for utility scale solar development such as:

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

The second iteration of the screening process consisted of evaluation of the existing electrical transmission system and the capability of supporting the development of a large-scale solar power facility. Areas with nearby loads, planned large reductions in generating capacity or a combination of the two were incorporated into the expectation for transmission system suitability.

Iteration three consisted of desktop mapping of wetlands and other environmental features to evaluate suitability of the land within the already refined areas. Areas with large wetlands and other environmental features would involve additional impacts and require additional cost to successfully develop, and therefore, such areas were eliminated. After this refinement, land ownership was evaluated to determine the level of cost and the timeline required to secure the necessary site. Sites with a single or few landowners were generally favored over those with many. Additionally, landowner contact information was collected and initial interest gauged through telephone calls and email conversations.

The list of candidate sites for the final project siting was ultimately narrowed down to two sites, River Bend and Prairie Point, based on the above-mentioned criteria. An analysis was performed on the Prairie Point site in Noxubee County in eastern Mississippi to identify high-level development and permitting constraints. These included identification of known environmentally-sensitive resources and potential land use or zoning conflicts. Separately, a preliminary review of the transmission system to which the project would interconnect was conducted. It was determined that the transmission system would not be capable of supporting the project without major technical upgrades. As there were no viable alternative interconnection points available in the area, the site was deemed unsuitable for development at this time.

2.4 COMPARISON OF ALTERNATIVES

This EA evaluates the potential environmental effects that could result from implementing the No Action Alternative or the Proposed Action at the River Bend site in Lauderdale County, Alabama. The analysis of impacts in this EA is based on the current and potential future conditions on the property and within the surrounding region. A comparison of the impacts of the alternatives is provided in Table 2-1.

Table 2-1.
Comparisons of Impacts by Alternatives

Resource Area	**Impacts from the No Action Alternative (Status Quo)**	**Impacts from Proposed Action**
Land Use	No direct impacts anticipated. Indirect impacts are possible as undeveloped land may become residential over the long term.	Minor direct adverse impacts. Land use on the project site would change from undeveloped and agricultural to industrial. The surrounding area, however, is largely agricultural, undeveloped and residential, which would not change. No indirect impacts.
Geologic Resources and Prime Farmlands	No direct or indirect impacts anticipated.	Minor negative impacts related to erosion and sedimentation. Minor negative impact due to conversion of 3.0 percent of prime farmland in Lauderdale County. No indirect impacts anticipated.
Water Resources	No direct or indirect impacts anticipated.	**Groundwater**: No direct adverse impacts anticipated. Potential minor beneficial impacts from reducing fertilizer and pesticide runoff entering groundwater. **Surface Water:** Minor temporary direct adverse impacts during construction, with the use of best management practices (BMPs). Potential minor beneficial impacts from reducing fertilizer and pesticide runoff entering surface waters. **Floodplain:** No direct or indirect impacts anticipated. **Wetlands:** Minor direct adverse impacts that would be minimized with the use of BMPs. No indirect impacts anticipated.
Biological Resources	No direct impacts anticipated. Potential indirect impacts if current human practices are discontinued.	**Vegetation:** Minor temporary direct and indirect adverse impacts associated with the grading of 160 acres and the mowing/surface preparation of 353 acres of fallow farmland vegetation. Minor direct adverse impacts associated with the clearing/grubbing of isolated shrubs and trees. **Wildlife:** Minor direct and indirect adverse impacts associated with displacement of wildlife during site clearing and grading and conversion of site to permanent grass-herb cover. **Rare, Threatened & Endangered (T&E) Species:** No impacts to federally listed species, no adverse impacts to state-listed species.
Visual Resources	No direct or indirect impacts anticipated.	Minor temporary direct and indirect adverse impacts during construction related to vegetation removal and use of heavy equipment. Moderate direct visual impacts in the immediate area, minor direct impacts over a larger scale.

Table 2-1.
Comparisons of Impacts by Alternatives

Resource Area	Impacts from the No Action Alternative (Status Quo)	Impacts from Proposed Action
Noise	No direct or indirect impacts anticipated.	Minor temporary direct and indirect adverse impacts during construction. Negligible adverse impacts associated with operation.
Air Quality and Greenhouse Gas Emissions	No direct or indirect impacts anticipated.	Minor temporary adverse impacts during construction. Minor beneficial impacts from operation due to a potential decrease in overall pollutant emissions.
Cultural Resources	No direct or indirect impacts anticipated.	No direct or indirect impacts anticipated.
Utilities	No direct or indirect impacts anticipated.	No direct or indirect adverse impacts anticipated. Beneficial direct impacts to electrical services due to additional renewable services in the region.
Waste Management	No direct or indirect impacts anticipated.	No significant direct or indirect adverse impacts anticipated with the use of BMPs.
Public and Occupational Health and Safety	No direct or indirect impacts anticipated.	Minor temporary adverse impacts during construction.
Transportation	No direct or indirect impacts anticipated.	Minor temporary direct adverse impacts during construction, with mitigation. No indirect impacts anticipated.
Socioeconomics	No direct or indirect impacts anticipated.	Moderate positive and long-term direct impacts from construction and operation of the Project. The local tax base would increase from construction of the solar facility and would be most beneficial to the Lauderdale County area.
Environmental Justice	No direct or indirect impacts anticipated.	No direct or indirect impacts anticipated.

2.5 THE PREFERRED ALTERNATIVE

The TVA-preferred alternative for fulfilling the purpose and need for this project is the Proposed Action: construction and operation of a single-axis tracking PV solar power facility, of up to 80-MW AC, on an approximately 645-acre site in Lauderdale County, Alabama with the energy generated being sold to TVA under a 20-year PPA. The preferred alternative (Proposed Action) would produce renewable energy for TVA and its customers with only minor direct and indirect environmental impacts, would help meet TVA's renewable energy goals, and would help TVA meet future energy demands on the TVA system.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

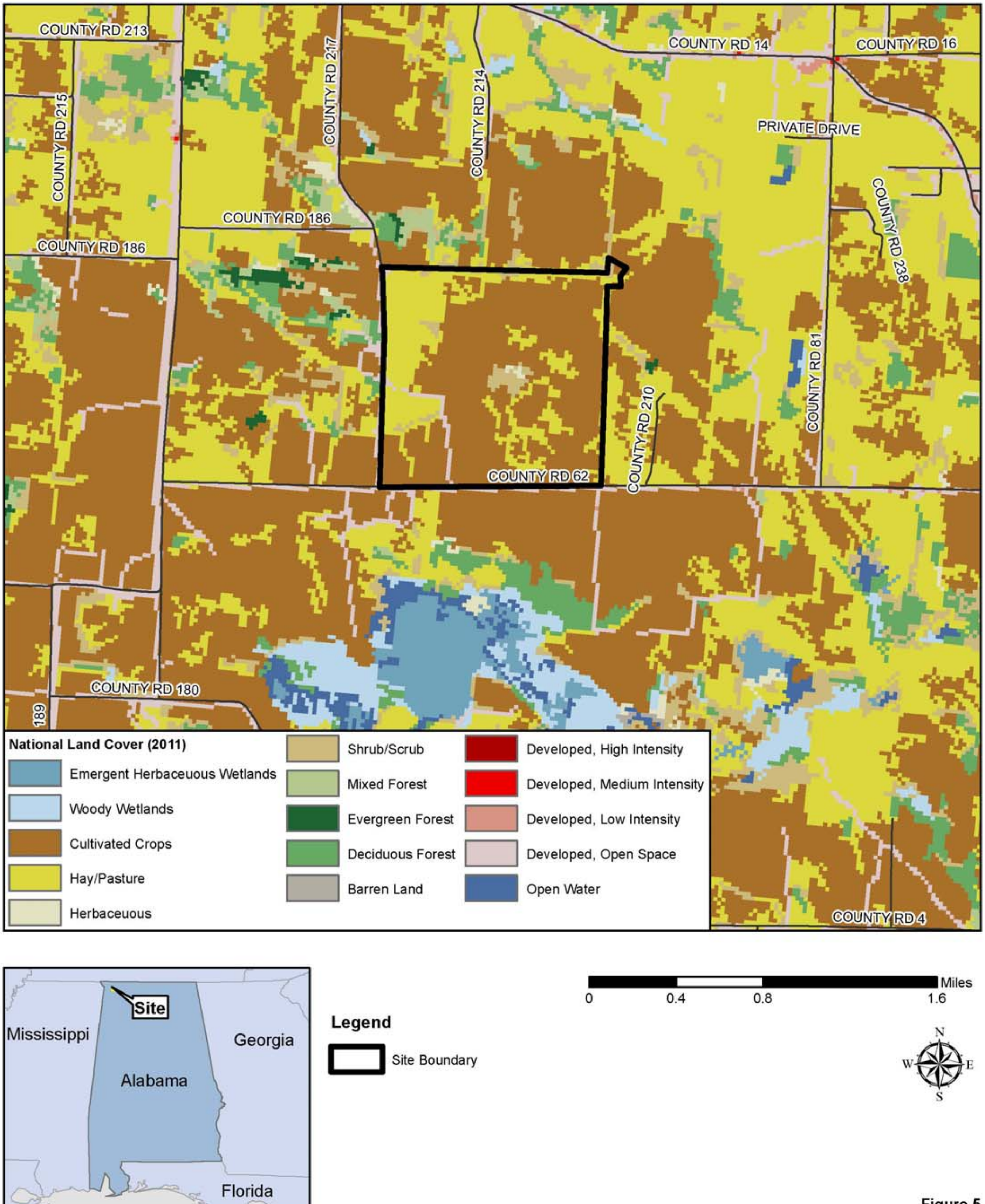
3.1 LAND USE

This section describes an overview of existing land use at and surrounding the Project Area and potential impacts to land use associated with the No Action and Proposed Action alternatives. The project site is located in the Oakland Census Subdivision of Lauderdale County, Alabama. Oakland is an unincorporated town, approximately 2 miles east of the proposed project site (Figure 1).

3.1.1 Affected Environment – Land Use

Land use is defined as the way people use and develop land, including uses such as undeveloped, agricultural, residential, and industrial. Many municipalities develop zoning ordinances and planning documents to control the direction of development and to keep similar land uses together. Although the project site is within the jurisdiction of the Shoals Economic Development Authority, there is no zoning ordinance or other governmental regulation of development at the project site (Shoals Economic Development Authority 2015a). The closest area which has a written development plan is the City of Florence, located approximately 5 miles east of the site (Figure 1). Land use on the project site is not officially governed by a municipality. Images generated with the National Land Cover mapping tool show the project site as agricultural land, primarily cultivated crops with areas of hay/pasture land and small isolated pockets of shrub/scrub (Figure 5).

The majority of the Project Area is agricultural land, containing a few dirt access roads and small tree stands (Figure 2). The site consists of gently rolling terrain with small hills and depressions across the site, and ranges in elevation from approximately 520 to 580 feet above mean sea level (msl) (Figure 6). The majority of the site is comprised of actively farmed corn and cotton crops. Several small stands of shrubs and trees are present across the site. A tributary of Sinking Creek crosses the site from just north of the center of the site to the southwestern side of the site (see UT-A on Figures 6 and 10). Several roughly circular or oval depressions are located in various locations around the site, including Delahunty Pond located in the northwest corner of the site; however, none of these depressions appear to contain water year-round (per review of currently available and historic aerial imagery).



Source: National Land Cover Database 2011

Figure 5
Land Cover Map (2011)

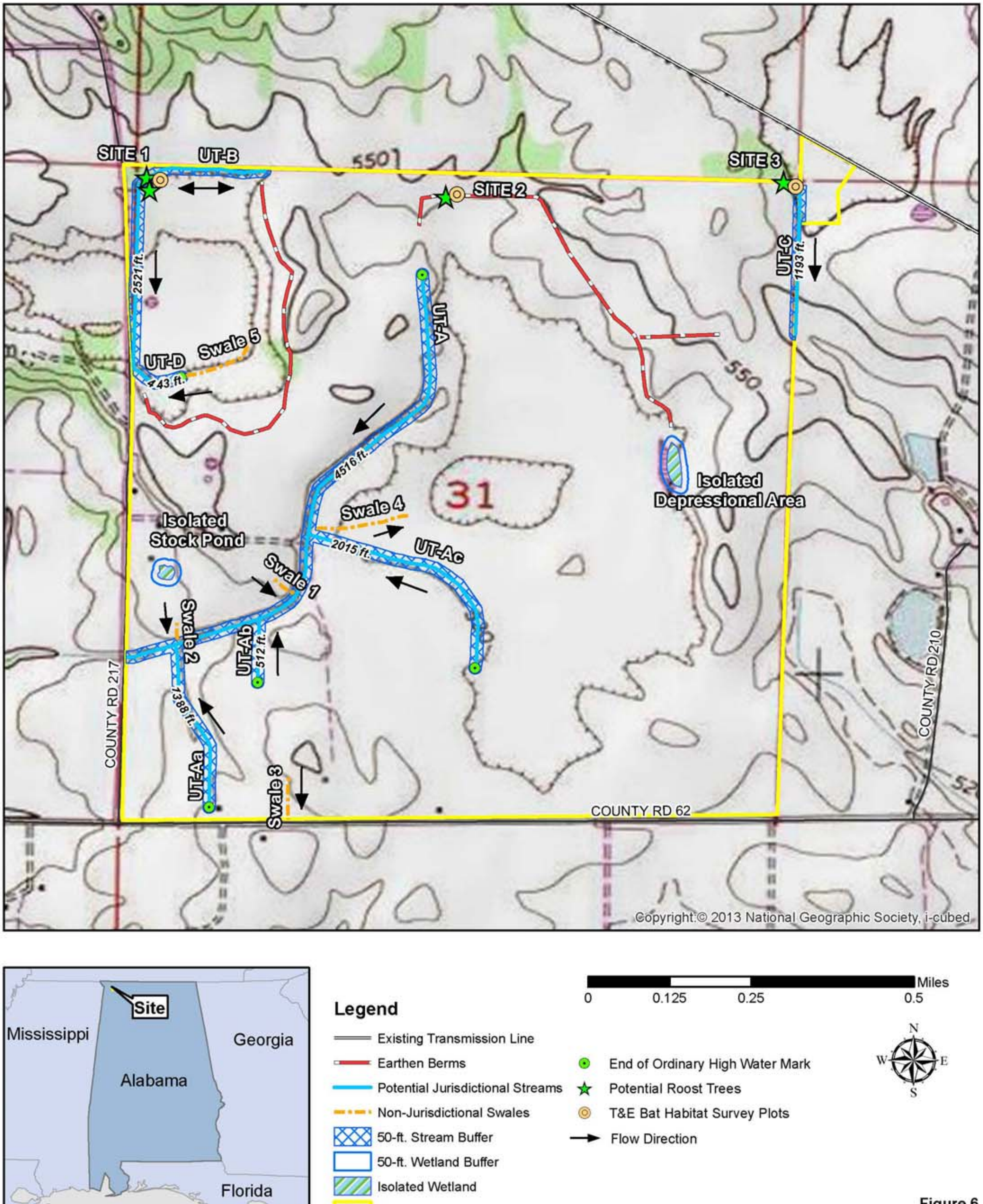


Figure 6
Wetlands and Bat Habitat Topographic Map

Source: ArcGIS Topo Map

Several old structures and a newer metal building are present near the center of the western boundary of the site. Another old barn structure is present along the southern site boundary, slightly west of the center (Figure 2). The majority of these structures appear to be agricultural or residential in nature. A dirt road connects these two groups of structures. The northeastern corner of the site has several small stands of trees. It is bounded on the north and northeast by a tributary of Sinking Creek, which is lined by trees.

Properties immediately adjacent to the site on all sides are rural agricultural parcels in various stages of cultivation, or undeveloped land (Figure 5). The closest populated area, Oakland, Alabama, is a town with approximately 4,000 residents (Citydata.com 2015). The nearby City of Florence has a population of approximately 40,000 (US Census Bureau 2015). There are approximately 17 industrial parks and sites within the Shoals Economic Development area; however, none are in the vicinity of the project site.

3.1.2 Environmental Consequences – Land Use

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

3.1.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility and transmission line would not be constructed; therefore, no project related impacts to land use would result. Existing land use would be expected to remain a mix of farmland and undeveloped land.

Indirect impacts to land use are possible as the Town of Oakland and the City of Florence grow. Over time, it is possible that the agricultural areas on the project site could become developed if the resident population in the area grows significantly. Additionally, if the agricultural practices on-site are discontinued, land use could be converted to undeveloped land. Indirect impacts to land use are possible under the no action alternative as agricultural land may become residential or unused over the long term.

3.1.2.2 Proposed Action

Under the Proposed Action, impacts to land use would occur. Land use on the project site would change from agricultural to industrial. Figure 3 shows the proposed layout of the solar array and associated industrial development; Figure 4 shows the site grading plan. Although biologically sensitive areas would be avoided, a total of 645 acres of fields would be replaced by solar arrays, access roads, a substation, and other ancillary features. Within the project area, jurisdictional streams and wetlands would be avoided. The 645-acre project area also includes an approximately 5-acre area in the northeast corner where proposed transmission facilities would be located. The construction and maintenance of these transmission lines would also require access roads capable of supporting heavy equipment (discussed in Section 2.2.3.2).

Overall, a total of 645 acres of farmland and undeveloped land would be affected by the Proposed Action. The surrounding area, however, is largely agricultural, undeveloped and sparsely residential, which is not likely to change significantly over the next 20 years. As a relatively small portion of a very large land use category in the vicinity would be lost, this adverse impact would be minor overall. Following decommissioning of the solar farm, a large portion of the site could return to agricultural use. The activities associated with the Proposed Action would not have any indirect effects on land use.

3.2 GEOLOGY, SOILS, AND PRIME FARMLAND

This section describes the existing geological resources within the Project Area and the potential impacts on these geological resources that would be associated with the No Action and Proposed Action. Components of geological resources that are analyzed include geology, paleontology, soils, and Prime Farmland.

3.2.1 Affected Environment – Geology, Soils and Prime Farmlands

3.2.1.1 Geology

The project site is located in Lauderdale County, Alabama, near the southern edge of the Interior Low Plateaus geographic province. This province extends from northern Alabama to southern Illinois, Indiana and Ohio. There are five physiographic sections in Alabama, the Cumberland Plateau, Highland Rim, Valley and Ridge, Piedmont Upland, and East Gulf Coastal Plain. The project site is in the Highland Rim section. The landscape has an east-west trending ridge and valley topography, varying from 900 ft above msl in the north to about 420 ft above msl in the southern edges. The ridges are formed by Hartselle Sandstone, and the valleys have been carved out of Bangor Limestone and Tuscumbia Limestone. The Highland Rim is comprised of three smaller districts, the Tennessee Valley, the Little Mountain and the Moulton Valley districts. The project site is in the Tennessee Valley district (Encyclopedia of Alabama 2015).

The site is underlain by Tuscumbia Limestone. Tuscumbia Limestone is generally light-gray and fine to coarse-grained (Moriarty 2015).

3.2.1.2 Paleontology

Significant paleontological resources are present in Alabama and are potentially present beneath the project site. Life was abundant in the semi-tropical, warm, salty ancient sea and an abundance of marine fossils, and possibly some fossils from land-based species washed into the bay by rivers or during flooding events, are found within the sedimentary layers. Fossils are known to be present in places within the Tuscumbia Formation. It is unknown if fossil remains are present within the project boundary.

3.2.1.3 Geological Hazards

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

There are no volcanoes within several hundred miles of the proposed project site. Tuscumbia Limestone comprises the uppermost geologic unit underlying the project site (Moriarty 2015). The Tuscumbia Limestone is prone to karst terrain. Karst terrain is topography with distinctive landforms and hydrology that is created by the dissolution of limestone and dolomite layers. Springs, caves, and sinkholes are all distinctive features of karst terrain. The size and extent of any karst features is dependent on the geological and hydrological characteristics of any specific site. Karst terrain can be found throughout Lauderdale County and within the project site (GSA 2015; USFWS 2007; Figure 7). A geological hazard assessment could be conducted (if needed) to determine the potential for future karst formation at the project site. The presence of on-site karst terrain would not be anticipated to cause an adverse impact to geology. The development of karst features under individual arrays could cause damage to those specific arrays, but would not have significant impacts on the surrounding area.

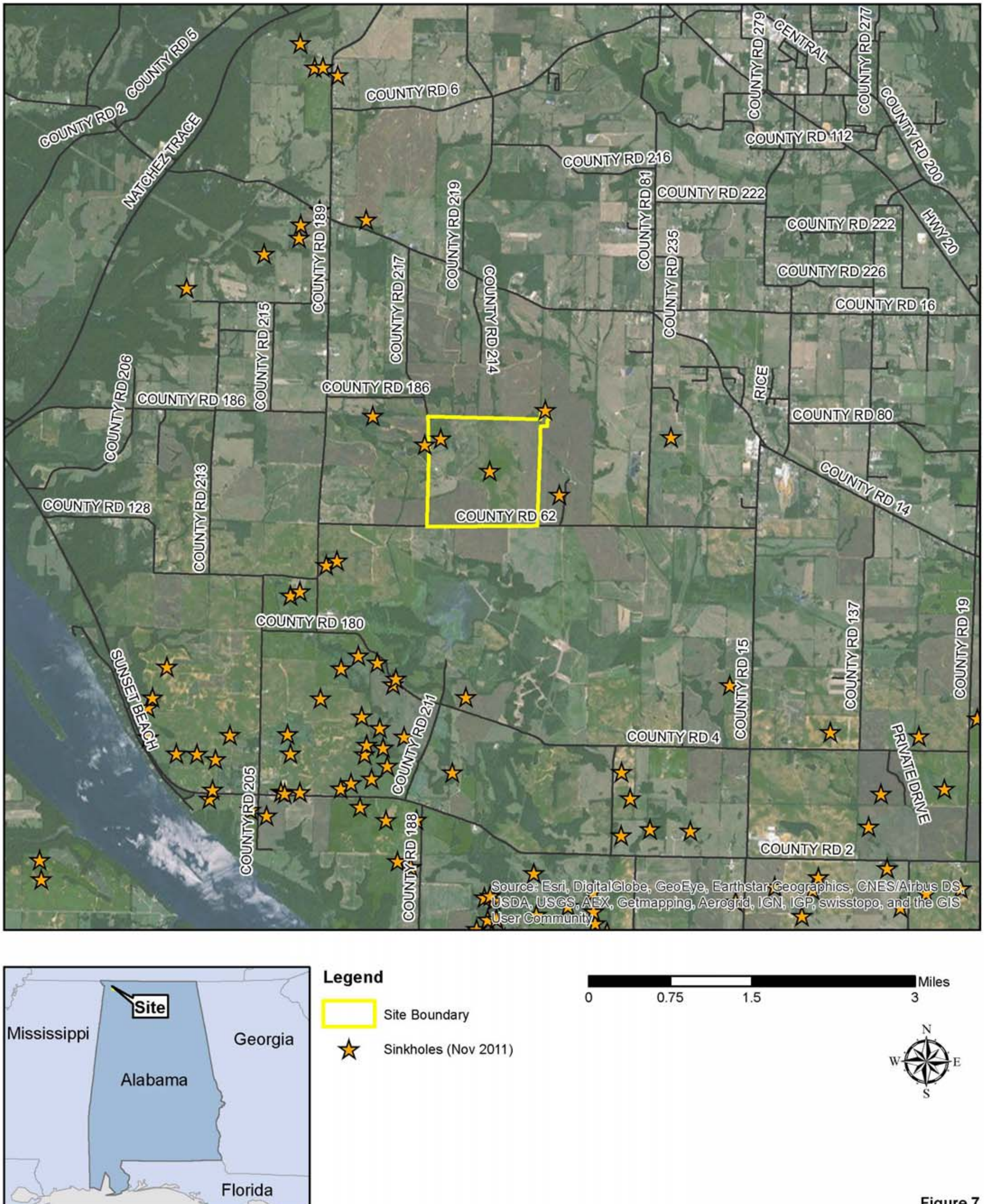
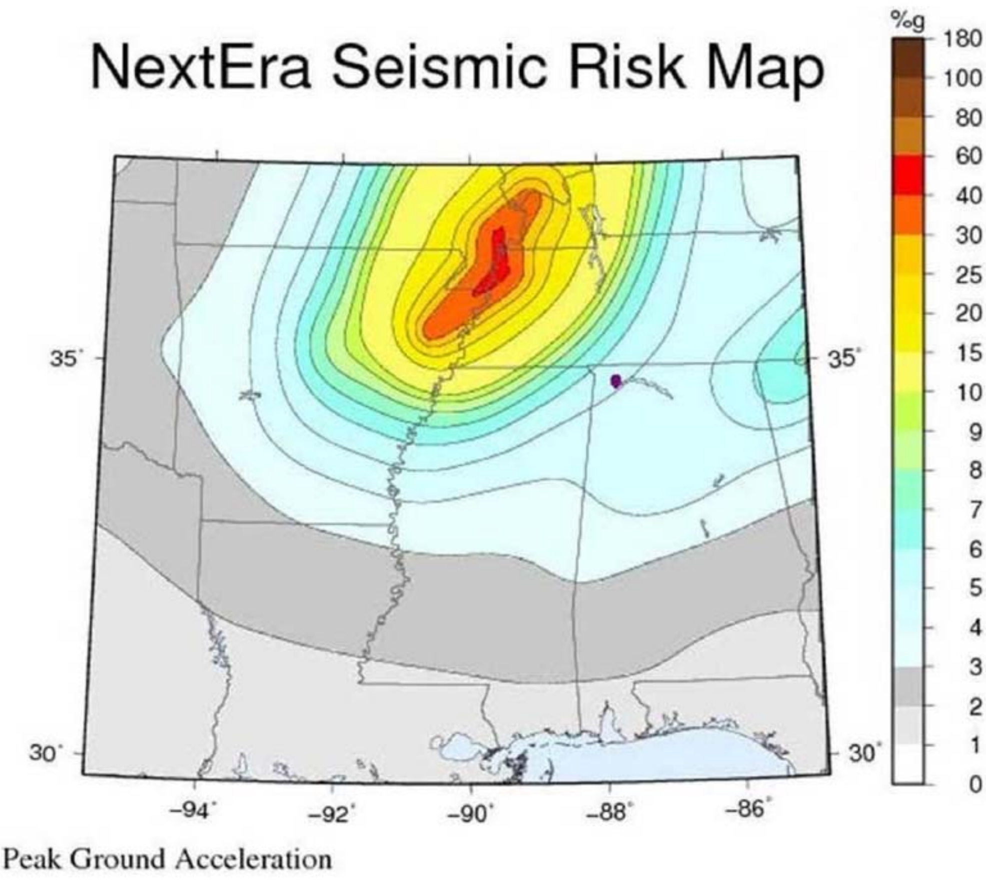


Figure 7
Regional Karst Terrain Map

Source: ArcGIS Aerial Map, USGS

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 US to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of "g," the acceleration due to gravity. The US Geological Survey (USGS) Earthquake Hazards Program publishes seismic hazard map data layers that display the PGA with 10 percent (1 in 500-year event) probability of exceedance in 50 years. The potential ground motion for the proposed project site ranges from 0.05 to 0.06 g, for a PGA, with a 5 to 6 percent probability of exceedance within 50 years (Figure 8; USGS 2008).



Peak Ground Acceleration (Seismic Risk) at the Potential Project Sites.
The purple dot represents the approximate location of the project sites.

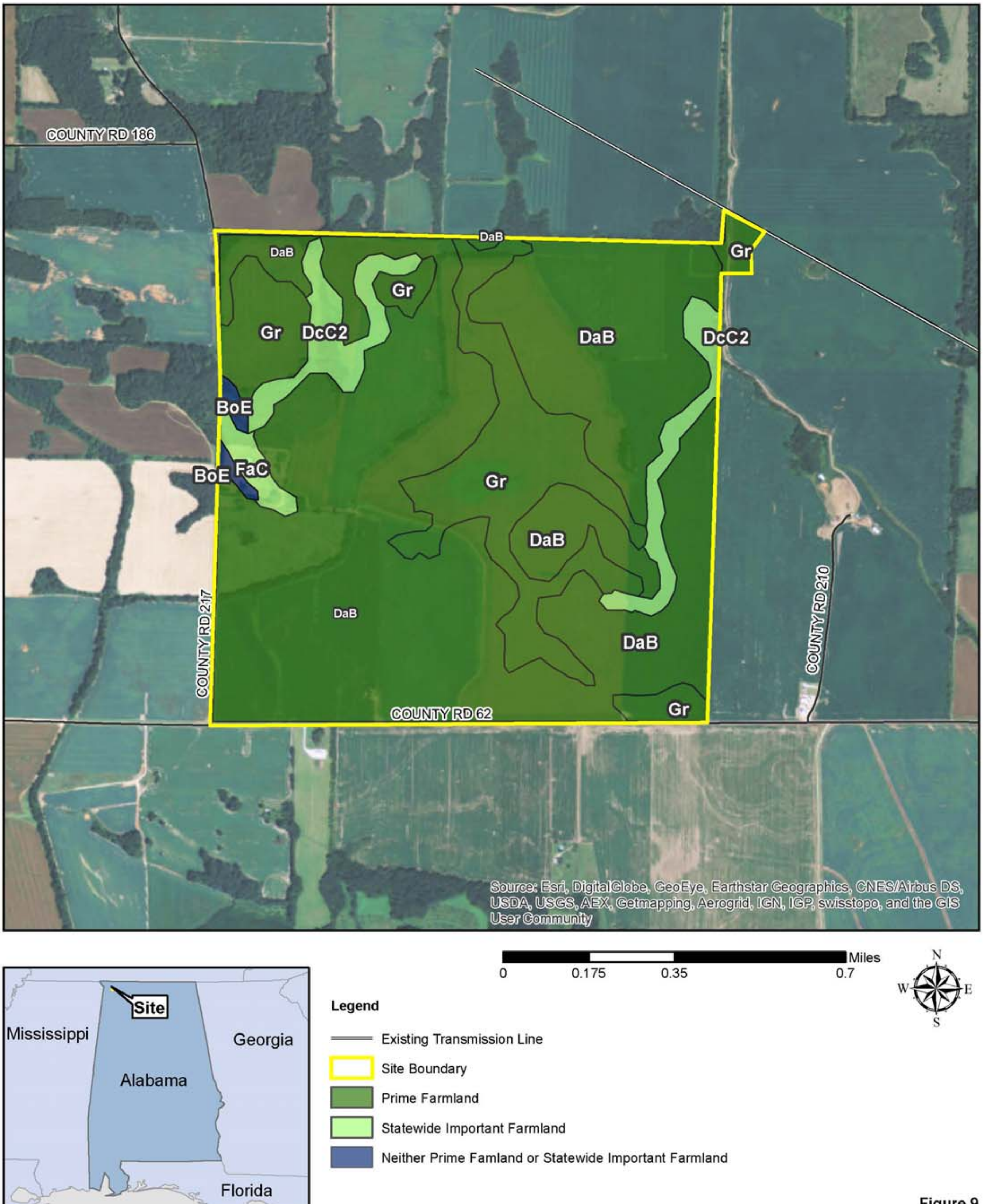
Figure produced with USGS Earthquake Hazards Program online mapping tool (http://earthquake.usgs.gov/hazards/).

Figure 8
Seismic Risk Map

3.2.1.4 Soils

The majority of the soils on the project site are composed of Decatur silt loam, Dewey silt loam, Grasmere silty clay loam, Lobelville cherty silt loam, Fullerton gravelly silt loam, and Bodine gravelly silt loam (Figure 9). Decatur silt loam, Decatur silty clay loam, Dewey silt loam, Grasmere silty clay loam are all classified as prime farmland. Additionally, the Decatur silt loam and Fullerton gravelly silt loam are classified as farmland of statewide importance. Only the Bodine gravelly silt loam which occupies a small percentage of the site is not prime farmland or farmland of statewide importance (USDA 2014).

The Decatur soil series is a deep, well-drained gently sloping soil found on uplands. These soils formed from weathered limestone and a mixture of old valley fill material. On the surface is a reddish brown silt loam turning to dark reddish-brown silty-clay loam at about seven inches deep. The subsoil is dark red clay, becoming dark reddish-brown clay at approximately 40 inches deep. Decatur silt loam has small areas of Dewey, Fullerton and Grasmere soils interspersed. Decatur silty clay loam has a surface layer of silty clay loam. Both soil types are well suited to all crops commonly grown in the county. The Grasmere soil series consists of deep well-drained nearly level to depressional soils found along small drainageways on uplands. They formed from material washed from adjacent higher lying soils weathered from limestone. The soil profile is similar to the Decatur series. Grasmere silty clay loam includes small areas of somewhat poorly drained soils formed from alluvial material. The Lobelville soil series consists of deep well-drained soil in nearly level areas on floodplains. They formed from loamy alluvium washed from material weathered from cherty limestone and some loess. The surface layer is brown cherty silt loam turning to yellowish-brown cherty silt loam with light brownish-gray mottles. The Fullerton soil series consists of deep well-drained cherty soils on gently to strongly sloping uplands. The surface soil is brown cherty silt loam, turning to yellowish-red cherty silt clay at approximately 35 inches deep. The subsurface is red cherty clay mottled with brown and brownish gray. Fullerton gravelly silt loam has small areas of Dewey and Dickson soils included with coarse cherty fragments in the surface and subsurface. The Bodine soil series consists of deep well-drained to excessively drained soils on strongly sloping to steep uplands. The surface is dark grayish-brown cherty silt loam turning to brown cherty silt loam at about three inches deep. The subsurface is yellowish-brown cherty silt loam, becoming strong brown cherty silt loam to a depth of approximately 50 inches. Bodine gravelly silt loam is the only Bodine soil found in Lauderdale County. It has small areas of Dickerson, Fullerton, Lee and Saffell soils including a surface layer of loam (NRCS 1977).



Source: ArcGIS Aerial Map

Figure 9
Site Soil Map

3.2.1.5 Prime Farmland

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

The on-site soil types which are considered prime farmland are Decatur silt loam and Grasmere silty clay loam. The location of prime farmland soils on the site is identified on Figure 9. Based on information from the USDA NRCS, prime farmland soils occur on approximately 602 acres (93 percent) of the 645-acre River Bend Solar Site. In addition to the prime farmland on-site, there are approximately 43 acres of statewide important farmland (Figure 9). Farmland of statewide importance is not federally recognized prime farmland, but land which is important in the production of food, feed, fiber, forage, and oil seed crops. Individual states delineate their own important farmland (NRCS 2015).

Table 3.2-1 provides a summary of farming in Lauderdale County and overall in the State of Alabama for comparison. The change in farming and farming acreages from 2002 to 2007 is also included.

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

Table 3.2-1. Farming Statistics for Lauderdale County, Alabama

	Number of Farms	Percentage of Total Area in Farms	Land in Farms (Acres)	Average Size of Farms (Acres)	Change from 2002 to 2007		
					Number of Farms	Land in Farms (Acres)	Average Size of Farms (Acres)
Lauderdale County	1,697	53.3	227,692	2,329	212	19,651	-6
Alabama	48,753	27.9	9,033,537	185	-3,627	-129,150	-12

Source: USDA 2007

A Farmland Conversion Impact Rating (Form AD-1006) was completed by TVA and the NRCS to quantify the potential impacts to prime farmland. The impact rating considers the acreage of prime farmland to be converted, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban support services and built-up areas, potential effects of conversion on the local agricultural economy, and compatibility with existing agricultural use. Sites with a total score of at least 160 have the potential to adversely affect prime farmland. The impact rating score for the River Bend site was 180 points (Appendix G).

Form AD-1006 was also completed for the Prairie Point site in Noxubee County, Mississippi, which had been previously considered by River Bend as a potential site for the solar farm (see Section 2.3). The Prairie Point site impact rating score was 185.3 points (Appendix G).

3.2.2 Environmental Consequences – Geology, Soils and Prime Farmlands

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

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility and transmission line 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 undeveloped land.

Over time, indirect impacts to soils and geology could occur if the current land use practices are abandoned. If the site were to be developed, changes to the soils on-site would occur. Conversely, if agricultural practices were continued, soils could eventually become depleted in nutrients or erode resulting in minor changes on the site.

3.2.2.2 Proposed Action

Under the Proposed Action, minor direct impacts to geology and soil resources would be anticipated as a result of construction and operation of the Project. Approximately 160 acres would be cleared and graded and approximately 353 acres would be mowed; light surface preparation and tall vegetation removal would occur as needed within the mowed areas (Figure 4). This would cause minor impacts to geology and soils including minor, localized increases in erosion and sedimentation.

Geology and Paleontology

Under the Proposed Action, minor impacts to geology and paleontology could occur. A geotechnical evaluation of the project site was completed in May 2015. As part of this investigation, 25 test borings were drilled throughout the site; all were at least 20 feet deep and none of them encountered bedrock (Moriarty 2015).

The solar arrays would be supported by steel piles which would either be driven or screwed into the ground to a depth of 6 to 10 ft. The substation and prefabricated 2,500 square-foot O&M building would occupy approximately 1 acre total and would not require deep excavation. On-site detention basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected with underground wiring placed in trenches about three feet deep. Additional minor excavations would be required for the medium voltage transformers associated with each PCS unit. Two or three tower pads would be required to connect the arrays to the TVA transmission system. The towers would require some foundation work below the ground surface. Due to the small sizes of the subsurface disturbances, only minor direct impacts to potential subsurface geological and paleontological resources are anticipated.

As no significant excavation would be required, only minor direct impacts to geological and paleontological resources would be anticipated. Should paleontological resources be exposed during site construction (i.e., grading, trenching and foundation placement) or operation activities, a paleontological expert would be consulted to determine the nature of the paleontological resources, to recover these resources, to analyze the potential for additional impacts, and to render a recovery plan/mitigation strategy.

Geologic Hazards

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

Soils

As part of the site preparation and grading process, the top soil on the approximately 160 acres to be graded would be removed and stockpiled (Figure 4). Once the site is graded, the topsoil would be replaced prior to the construction of the arrays. The topsoil under the O&M building, the substation, and the transmission line tower pads would not be replaced. This would result in long-term impacts to topsoil on approximately 14.5 acres. Approximately 353 acres would be temporarily impacted during mowing and construction activities, including light surface preparation. Soils located in areas where only vegetation clearing is proposed would remain in place unless a circuit trench or foundation would be constructed. These acreage totals do not include the 50-ft stream/wetland buffers and/or any other sensitive biological resources encountered during the pre-construction stages.

The grading plan was designed to impact the least amount of soil possible, such that on-site soils would be used to fill areas that needed to be elevated per PV array design specifications. Although not anticipated, should borrow material be required, small amounts of sand and gravel aggregate may be obtained either from on-site activities, or from local, off-site sources. The creation of new impervious surface, in the form of the access roads, panel footings and the foundations for the substation and the operations building, would result in a minor increase in stormwater runoff and potential increase in soil erosion. Use of BMPs such as soil erosion and sediment control measures would minimize the potential for increased soil erosion and runoff. As part of an initial geotechnical study, on-site subsurface conditions were evaluated in part using percolation testing. Results indicated zero percolation, which may have been influenced by seasonal effects (e.g., testing conducted during a wet winter). A specific leach field test was not included in the evaluation; however, the results of the geotechnical testing indicated that a leach field is not a viable option. Therefore, sewer treatment for the Project would be accomplished through use of a pump-out septic holding tank.

Due to the Project disturbance area being at least one acre, a NPDES Permit for discharges of stormwater associated with construction activities would be required. Application for the permit would require submission of a CBMPP 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.

In addition to the on-site soil disturbance, there would be minor impacts within the proposed 100-foot wide transmission line corridor (located within the 5-acre easement in the northeast corner; Figure 3). Approximately 2 to 4 construction pads may be required to set the transmission poles in the new transmission line. The pads would be 50 by 50 ft in size. The ROW would be cleared to construct the transmission line and access roads would be required for the heavy equipment. Impacts would be similar to those on-site, although smaller. The only permanent impacts along the transmission lines would be from the tower footings and the access roads. In the event of sensitive biological resources in the ROW such as wetlands or streams, similar BMPs and permits would be required and implemented on the ROW during and post-construction to reduce erosion and sedimentation possibilities. The ROW would be allowed to re-vegetate or would be seeded as necessary after construction to minimize erosion and possible sedimentation.

During operation of the solar facility, very minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement, inverter air filter replacement, fence repair, vegetation control, and periodic array inspection, repairs and maintenance. The Project would implement one of two potential methods of vegetation control during operations: 1) traditional mechanized landscaping using lawnmowers, weed eaters, etc.; or 2) sheep grazing. Traditional trimming and mowing would be performed periodically to maintain the vegetation at a height ranging from 6 inches to 2 ft. Grazing sheep could also be used for controlling vegetation on the site. The security fence around the site perimeter would serve to keep the sheep inside if that option is selected. Module washing would occur no more than twice a year and would use BMPs and a CBMPP to prevent any soil erosion or stream and wetland sedimentation. Selective use of herbicides may also be employed around structures to control weeds. Products used would be limited to post-emergent herbicides and would be applied by a professional contractor. These maintenance activities would not result in any adverse impacts to soils on the project site during operations.

Prime Farmland

Should the Proposed Action be implemented, approximately 602 acres of prime farmland and 43 acres of statewide important farmland on the site would be converted to nonagricultural use, precluding farming for the duration of site operations. These acreages do not reflect potential biologically sensitive areas that could be encountered during the mobilization stages of construction. River Bend has proposed to remove the topsoil prior to grading and then replace the topsoil after grading within the graded areas designated on Figure 4. This would result in minimal loss of soil productivity. Impacts to soils at the substation, O&M building, PCS packages, pad-mounted transformers, and the detention basin(s) would be greater. The total area of these facilities would be approximately 14.5 acres. Regardless, the entire 645-acre project area would be directly converted from prime farmland/farmland of statewide importance to a developed solar power facility. In the event that the solar facility would be decommissioned and reclaimed in the future, the prime farmland could potentially be used again for agricultural purposes with little long-term loss of soil productivity on most of the project site.

The potential impacts on prime farmland soils at the River Bend site were evaluated using Form AD-1006, Farmland Conversion Impact Rating (Appendix G). The site received a total impact rating score of 180 points. Projects with total impact rating scores below the threshold value of 160 do not require further consideration under the FPPA. For projects with scores greater than or equal to 160, the FPPA does not require federal agencies to alter projects to avoid or minimize farmland conversion. However, for such projects, agency personnel are required to consider:

- Use of land that is not farmland or use of existing facilities;
- Alternative sites, locations, and designs that would serve the proposed purpose but convert either fewer acres of farmland or other farmland that has a lower relative values; and
- Special siting requirements of the proposed project and the extent to which an alternative site fails to satisfy the special siting requirements as well as the originally selected site.

Because the River Bend site received a total score above 160, the Prairie Point site in Mississippi that River Bend had previously considered (see Section 2.3) was reevaluated for prime farmland. The total impact rating score for the Prairie Point Site was 185.3 points, slightly greater than that of the River Bend site. The River Bend site, therefore, remains the preferred site. The project would convert a total of approximately 3.0 percent of prime farmland in Lauderdale County, Alabama to non-agricultural use. Following decommissioning of the solar farm, the majority of the site could be returned to agricultural use with little reduction in soil productivity. The adverse impacts of this minor and potentially reversible conversion of prime farmland would not be significant.

3.3 WATER RESOURCES

This section describes an overview of existing water resources at the proposed Lauderdale County, Alabama project site and the potential impacts on these water resources that would be associated with the Proposed Action and the project alternatives. Components of water resources that are analyzed include groundwater, surface water, and wetlands.

3.3.1 Affected Environment – Water Resources

3.3.1.1 Groundwater

Groundwater is water located beneath the ground surface, within soils and rock formations. A rock unit that has sufficient permeability to conduct groundwater and to allow economically significant quantities of water to be produced by man-made water wells and natural springs is known as an aquifer. To be productive, the aquifer must be permeable and porous and retain qualities that allow water to flow through it easily. Sandstones, conglomerates, and fractured rocks can often be productive aquifers. The aquifer underlying the project site in Lauderdale County is the Interior Low Plateaus aquifer system. The Interior Low Plateaus System also reaches north into Tennessee and Kentucky (Miller 1990, Lloyd and Lyke 1995).

Aquifers in the Interior Low Plateaus physiographic province consist of permeable stratigraphic units within flat-lying sedimentary rocks of Paleozoic age. In this province, erosion has removed part (or all) of the resistant sandstone cap, exposing underlying limestone at the surface. Rocks comprising the Interior Low Plateaus aquifers in Alabama are mostly limestone, sandstone, and shale, but also include beds of siltstone, conglomerate, dolomite, and chert. They range in age from Devonian to Pennsylvanian. Most of the rock formations are continuous from Alabama into extreme northwestern Georgia (Miller 1990).

Precipitation falling directly on surface outcrops of the aquifer units provides the primary water recharge for the Interior Plateaus aquifers. Most of this precipitation becomes surface water streams, but some percolates through the soil and runs into cracks and fissures in the bedrock. Due to the predominance of joints, fractures, bedding planes, and solution openings, groundwater discharge from springs is common in this province (Lloyd and Lyke 1995). Groundwater flow in this province is highly impacted by the topography and structure of the rocks, including fissures, and differential erosion (Miller 1990).

The water quality in the Interior Low Plateaus is variable, but mostly suitable for all domestic uses. Sulfate and dissolved iron levels can be high, imparting a rotten-egg scent to the water and staining plumbing fixtures. Dissolved solids concentrations increase with depth in the aquifers, with concentrations as high as 1,000 milligrams per liter (Miller 1990).

In 1985, fresh groundwater withdrawals from the Low Interior Plateaus aquifer system were estimated to be 133 million gallons per day (mgd), mostly along the Ohio River in Kentucky. Three quarters of this water was withdrawn for industrial uses including manufacturing, mining and thermoelectric power. The next largest withdrawals were for public water supply, at approximately 20 percent (Lloyd and Lyke 1995). In 2005, Lauderdale County withdrew a total of 3.97 mgd (USGS 2013).

Lauderdale County is in the Highland Rim section of the Interior Low Plateaus province. The area has a relatively high baseflow, defined as discharge from aquifers to streams. The Highland Rim section is further divided into three aquifers, the aquifer underlying the project site is the Tuscumbia-Fort Payne Aquifer. This aquifer is used for public supply throughout its outcrop area. Groundwater movement within this aquifer is generally toward the Tennessee River from the north and the south. Due to the geology and the presence of many sinkholes in the area, this aquifer is considered highly susceptible to contamination from surface processes. Additionally, due to the fragmented and fissured geology, contaminants can travel long and unpredictable distances (Bossong and Harris 1987).

3.3.1.2 Surface Water

The proposed project site is located in the Tennessee River Watershed. The Tennessee River begins in Tennessee, crosses northern Alabama, and then runs north through Kentucky where it joins the Ohio River. The Tennessee River Basin occupies seven states throughout its length. The portion of the basin that runs through Alabama is called the Great Bend. In Alabama, the river basin drains 13 percent of the state, encompassing 51,000 square miles (Riversofalabama.org 2015).

On a smaller scale, the project site is located within the Pickwick Lake Watershed, which occupies parts of three states, Alabama, Tennessee and Mississippi. There are six waterbodies in the watershed, including Pickwick Reservoir, which is a man-made reservoir on the Tennessee River. As of 2006, three of these waterbodies were considered impaired, mostly due to runoff from agricultural activities (USEPA 2015a).

The project site contains one permanent waterbody, an isolated stock pond located near the western boundary. A tributary of Sinking Creek crosses the project site from just north of the center of the site to the southwestern side of the site (Figures 6 and 10). Several roughly circular or oval depressions are located on the site, including one in the northwest corner of the site named Delahunty Pond. None of these depressions hold water year-round. A portion of the site is bounded on the north and northeast by a tributary of Sinking Creek; this tributary is lined by a stand of trees. Sinking Creek was assessed by the USEPA in 2012 and received a rating of ‘good’ with respect to fishing and agricultural and industrial uses. The creek was not assessed for contact recreation or the propagation of fish and wildlife (USEPA 2015b). Sinking Creek is not included on the Alabama Clean Water Act Section 303(d) list of impaired waters (ADEM 2014a).

In 2005, surface water use in the Pickwick Lake Watershed exceeded 1,300 mgd. Most of this water (over 1,200 mgd) was used for thermoelectric power generation at the Colbert Fossil Plant. Only 80 mgd was used for other uses, such as public supply and agriculture (USGS 2015).

On October 14 and 15, 2014, a wetland delineation and waterbody survey was conducted at the project site. During the survey, two non-jurisdictional wetlands, seven ephemeral stream channels and four wet weather conveyances (WWCs; also referred to as swales) were identified and mapped (Figures 6 and 10). All seven ephemeral streams, which include the mapped tributaries to Sinking Creek, were assessed as very low stream quality with intermittent flow mostly in channels constructed for agricultural drainage. All four swales were man-made and related to agricultural drainage (Jackson Environmental 2014). There are no waterbodies designated as having special designations or outstanding Alabama waters near the project area. The Tennessee River (and several of its tributaries in the project area including Sinking Creek) is classified by ADEM as public water supply (ADEM 2015). Portions of Pickwick Reservoir in Lauderdale County, near the project site, were listed as impaired in 2014 due to high chlorophyll a levels; the cause of this was nutrient levels attributable to agriculture (ADEM 2014a).

Legend

- Existing Transmission Line
- Earthen Berms
- Potential Jurisdictional Streams
- Non-Jurisdictional Swales
- Isolated Wetland
- 50-ft. Stream Buffer
- 50-ft. Wetland Buffer
- Site Boundary
- End of Ordinary High Water Mark
- Potential Roost Trees
- T&E Bat Habitat Survey Plots
- Flow Direction

Miles: 0 | 0.125 | 0.25 | 0.5

N W E S

Source: ArcGIS Aerial Map

Figure 10
Wetlands and Bat Habitat Aerial Map

3.3.1.3 Floodplains

The Federal Emergency Management Agency (FEMA) produces maps which show the likelihood of an area flooding. These maps are used to determine eligibility for the National Flood Insurance Program. The entire project site is located in Zone X, outside of the 100- and 500-year zones, having less than a 0.2 percent chance of flooding annually (Figure 11; FEMA 2009). It is possible that minor, localized flooding could be associated with the two small streams and the small on-site ponds, even though these features are not located in a mapped flood zone. The floodplain to the north of the site would be avoided during construction and operation of the proposed solar facility.

3.3.1.4 Wetlands

Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, and wet meadows. Wetland fringe areas also are found along the edges of most waterbodies and impounded waters (both natural and man-made). A desktop assessment using both the National Wetland Inventory (NWI) and the USEPA NEPAssist mapping tool was conducted to assess the project site for the presence of wetlands. The NWI map showed no officially recognized wetlands on the project site; however, the NEPAssist mapping tool revealed that wetlands were present on surrounding properties, but only small ponds were located on the actual property. A wetland delineation and waterbody survey was conducted by Jackson Group biologists on October 14 and 15, 2014 to identify wetlands within the project area.

During the survey, an isolated stock pond wetland, an isolated depression wetland, seven ephemeral streams, and four wet weather conveyances (swales) were identified and mapped (Figures 6 and 10). The stock pond was a man-made open-water farm pond. The isolated depression was formed by the construction of an earthen berm and received water from the surrounding agricultural fields. Both wetlands were inundated beyond their normal capacity due to recent rain events. No soil samples were taken due to this inundation (Jackson Environmental 2014).

The first wetland area is an isolated, manmade stock farm pond approximately 0.29 acres in size. Due to its depth and inability to support rooted-emergent or woody plant species, this feature is described by the Cowardin Classification System as Lacustrine, subsystem Limnetic deep water aquatic habitat. Since this pond lacks a significant nexus to jurisdictional waters and is a manmade artificial pond, it is considered to be non-jurisdictional under Clean Water Act Section 404 criteria. The stock pond/wetland was assigned a quality score of 17 out of a possible 100 using the TVA Rapid Assessment Method (RAM) quantitative rating system. This score is indicative of a relatively low quality wetland.

The second wetland area is an approximately 0.72-acre isolated depressional area. This aquatic feature is located in a low-lying portion of the project site and drainage patterns from the surrounding area are primarily controlled by an earthen berm constructed for agricultural land development and thus receives water from drainage of the surrounding agricultural fields. During the time of the survey, this area was inundated beyond its normal boundary due to precipitation events prior to and on the day the survey was performed. Because of water depths due to the inundation, a routine assessment could not be conducted; however, the surface water at the time of the survey gives evidence of hydrology.

Vegetation at this wetland included a dominant ring of sugar-berry trees (*Celtis laevigata*), a facultative wetland (FACW) plant species, bordering the wetland with the center of the depression containing only herbaceous plant species. Due to high water levels within the wetland, Jackson Group biologists were unable to collect soil samples or identify the plant species within the center of the wetland; however, given the hydrologic indicators and the dominant presence of the FACW sugar-berry, it was assumed that hydrophytic vegetation is present.

Given the presence of wetland indicators at the isolated depressional area, this feature is described by the Cowardin Classification system as a Palustrine System, dominated by forested and herbaceous plant species. Since this feature does not have a significant nexus to jurisdictional waters, it is considered an isolated, non-jurisdictional depressional area. This site was assigned a quality score of 39 out of a possible 100 using the TVA RAM quantitative rating system. This score is indicative of a moderate quality wetland.

A search of the TVA sensitive area resource (SAR) database identified one known wetland located within the OPGW transmission line corridor in the vicinity of structure 94 and cultural resources in the vicinity of structures 92 and 93 (Figure 2). The wetland is likely comprised of scrub-shrub vegetation. In addition, the following environmental resources are not listed in the SAR database but are known to exist: a pond between structures 100 and 101, and a wetland between structures 106 and 107. The primary land cover type for the approximately 2-mile long ROW stretch of proposed OPGW work is cropland and pasture. Short stretches of the line are close to residences in two locations, at County Road 62 and a short distance west of County Road 81.

3.3.2 Environmental Consequences – Water Resources

This section describes the potential impacts to water resources should the Proposed Action or no action alternative be implemented.

3.3.2.1 No Action Alternative

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

3.3.2.2 Proposed Action

Groundwater

No adverse impacts to groundwater would be anticipated as a result of the Proposed Action. Once installed, the total surface area of PV panels would be up to approximately 170 acres. The elevated, PV panels would cover roughly 25 percent of the site; however, they would have relatively little effect on groundwater infiltration and surface water runoff because the panels would not include a runoff collection system. Rainwater would run off the panels to the adjacent ground. Hazardous materials that could potentially contaminate groundwater would not be used or stored at the site. However, use of petroleum fuels, lubricants and hydraulic fluids during construction and by maintenance vehicles would result in the potential for small on-site spills. The use of BMPs to properly maintain vehicles to avoid leaks and spills and procedures to immediately address any spills that did occur, would minimize the potential for adverse impacts to groundwater.

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

No water service is currently available at the proposed site. River Bend does not propose to extend municipal water or sewer service to the site for the Proposed Project. Water in sufficient quantity and quality is expected to be available from wells to be installed at the solar facility. Wells would be constructed in accordance with applicable standards for construction, reconstruction, abandonments and destruction of water supply wells.

Construction-related water use would support site preparation (including operation of a portable concrete batch plant, if needed) and grading activities. During earthwork for the grading of access roads, foundations, equipment pads, and other components, the primary use of water would be for compaction and dust control. Smaller quantities would be required for preparation of the concrete required for building foundations, equipment pads, and other minor uses. Subsequent to the earthwork activities, the primary water use would be for dust suppression. Based on similar projects, River Bend estimates that the average water usage rate during construction would be approximately 80 to 100 gallons per minute (gpm). The total water usage during construction is estimated to be approximately 450 acre-feet (AF).

Drinking (potable) water would be supplied for construction workers on-site, and is estimated to be approximately 2,500 gallons per month (approximately 0.5 AF per year [AF/yr]), varying seasonally and by work activities. The potable water may be brought to the solar facility by tanker truck, or groundwater may be used with a package water treatment system to treat the water to meet potable standards.

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

Groundwater quality in the project area is unsuitable for potable use without treatment. Consequently, River Bend is considering options for treatment of groundwater or the option of trucking in potable water. If the groundwater option is selected, the water would be treated with a conventional package water treatment system to assure that any drinking water meets potable standards. Either a reverse osmosis (RO) treatment unit or deep bed de-mineralizer system would be used for other (non-drinking water) purposes. The water treatment system design has not been developed, but could include either a trailer mounted water treatment system or a free-standing facility. The water treatment system would supply water for the proposed Project for the purposes and in the amounts indicated in Table 3.3-1. A description of both is included below for purposes of this analysis.

A trailer-mounted water treatment system would consist of an enclosed, self-contained water treatment system. They are typically leased with a service contract, contain all the necessary supplies for operations, and are usually taken off-site for the periodic maintenance that is required. Minimal wastewater discharge is expected from the RO system.

A free-standing water treatment facility would contain the same equipment as the trailer-mounted system but be constructed on-site in an enclosure for more permanent use. The enclosure would be a pre-fabricated steel building on a concrete foundation with a maximum height of 17 ft. Water treatment equipment would include pumps, filters, biocide or ozone injection, and a RO system.

Based on the anticipated uses (including drinking water, showers, restroom facilities, panel washing, dust suppression, and 3,000-gallon dedicated water supply for fire prevention among other general uses), the estimated quantity of water needed for operation and maintenance of the River Bend Plant would be approximately 10 AF/yr. The primary use of water during operation and maintenance-related activities would be for panel washing and dust control (the proposed PV technology requires no water for the generation of electricity). The project site's internal access roads would not be heavily traveled during normal operations and consequently water use for dust control is expected to be low.

Table 3.3-1. River Bend Solar Proposed Water Usage

Water Use		PV Module Cleaning, Dust Control[1]	Potable Water[2]
Annualized Average	Rate (gpd)	7,500	150
Estimated Peak	Rate (gpd)	30,000	250
Estimated Annual	Use (AF)	9	1

[1]Water consumption based on the volume required to wash the PV panels approximately twice per year.
[2]Annual potable water consumption based on seven-day work week.

The panels would be cleaned on an as-needed basis, depending on the frequency of rainfall, proximity of arrays to sources of airborne particulates and other factors. This analysis assumes that panel washing would occur in the fall and spring and take approximately 30 days to complete per wash. Purified water from an off-site source, without detergents or other additives, would be utilized and applied to modules by sprayers mounted on trucks driving up and down the rows of modules. Panel washing could take a total of approximately 60 days per year to complete. Approximately 30,000 gallons per day (gpd), which equates to approximately 2.0 million gallons per year or approximately 9 AF/yr for the entire project, would be required to wash the panels. This water would be brought on-site in trucks for the specific purpose of panel cleaning and should not impact groundwater resources.

An additional approximately 6,000 to 10,000 gallons per month (less than 0.5 AF/yr) of potable water would be required to serve the demand of a maximum of approximately 20 on-site personnel, varying seasonally and by work activities. Potable water could be brought to the solar facility by tanker truck, or could be provided by treated on-site groundwater.

Decommissioning and Site Reclamation-related Water and Wastewater Needs

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

The project will comply with the requirements of the NPDES through preparation and implementation of a CBMPP and filing of a NOI to comply with the General Construction Stormwater NPDES Permit. The plan would include procedures to be followed during construction to prevent erosion and sedimentation, non-stormwater discharges, and contact between stormwater and potentially polluting substances.

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

Summary

Due to the relatively small amount of groundwater use (30,000 gpd) in comparison with the 2005 rate of withdrawal for Lauderdale County as a whole (3.97 mgd), impacts to the local aquifer and groundwater in general are not anticipated. The use of BMPs and a CBMPP would reduce the possibility of any on-site hazardous materials reaching the groundwater during construction, operations or maintenance. Overall, impacts to groundwater in the vicinity are not anticipated to be significant.

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

Surface Water

Construction and operation of the Proposed Project could affect surface waters. During construction, runoff of sediment and pollutants could reduce surface water quality on the property. The only permanent waterbody on the site is the isolated, man-made stock pond; however, there are ephemeral streams, WWCs, and an isolated depressional area. With the use of BMPs for controlling soil erosion and runoff such as the use of a 50-foot buffer zone and the installation of silt fences, the potential impacts to surface water would be minimized. During the panel layout process, care would be taken to avoid all jurisdictional features and wetlands. Additionally, construction of on-site stormwater detention basins would allow sediments to settle out prior to release from the pond. Therefore, through the use of BMPs and avoidance measures, impacts to surface water would be minor.

The construction of the transmission system interconnection would occur simultaneously with the construction of the solar arrays. Sensitive areas could be cleared in the ROW with non-mechanized methods. Subsequent re-clearing to maintain the 100-foot ROW would use similar methods. BMPs would be used throughout these processes to minimize any possible water quality impacts related to soil erosion. No changes to stream flows or the placement of existing water bodies are anticipated.

As described above for groundwater, minor beneficial, indirect impacts to surface water could result from the change in land use and the reduction in the amount of fertilizer and pesticide runoff to surface water resources, the reduced likelihood of erosion and sedimentation, and the reduction of the disturbance regime.

Floodplains

Although grading would be necessary to construct the Project, no direct or indirect impacts to the floodplain are anticipated under the Proposed Action. The project site is located outside of the 100- and 500-year floodplains (Figure 11). Drainage patterns should not be sufficiently altered by the construction of solar panels on the project site to change the flood classification of the property, especially with the avoidance of all jurisdictional features and wetlands. Additionally, the minimal amount of potential fill required (if necessary) to grade the site should not impact any adjacent properties with respect to flooding frequency or intensity. Therefore, impacts to floodplains associated with construction and operation of the Proposed Action are not anticipated. The action is consistent with the requirements of Executive Order (EO) 11988, Floodplain Management.

Wetlands

Under the Proposed Action, impacts to wetlands and ephemeral streams would be minimized as the site layout was designed to specifically avoid all jurisdictional aquatic features, permanent waterbodies and other sensitive biological areas. The two small, on-site isolated wetlands would be avoided. Throughout the Project, BMPs (e.g., silt fences, hand-clearing of vegetation, etc.) would be implemented in order to minimize any soil disturbance in the immediate vicinity of on-site wetlands and jurisdictional streams. The floor and embankments of the on-site detention basin(s) would be allowed to naturally reestablish native vegetation after construction, or replanted as necessary, to provide natural stabilization, minimizing subsequent erosion. This portion of the proposed project could constitute a beneficial impact to wetlands on the project site as a permanent increase in wetland area.

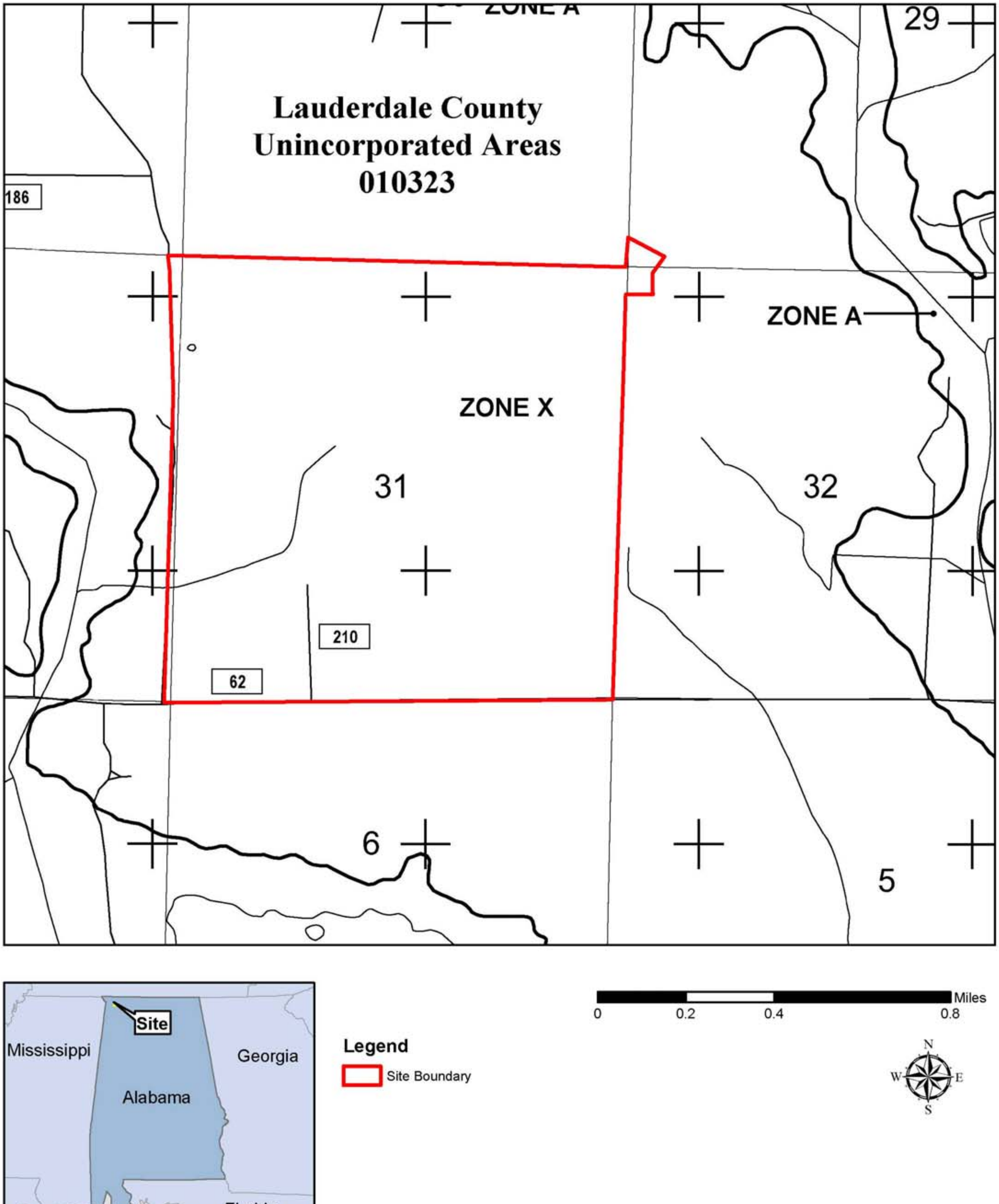


Figure 11
FEMA FIRM Map

Source: FEMA FIRM Maps

A short (approximately 1,000 ft) stretch of new transmission line would be constructed to interconnect the facilities with the existing TVA power grid. This transmission line would cross an ephemeral stream and associated buffer zone in the northeast corner of the project site. Vegetation both on-site and on the transmission line ROW would need to be cleared in wetland or intermittent stream areas utilizing non-mechanized equipment. This activity would alter the wetland vegetation type within these small areas (for potential stream and buffer impacts see Figures 6 and 10), but would not impact the overall hydrology of the site or ROW. These wetlands would continue to be classified as wetlands, but the specific vegetation type may differ from what currently exists there. Minor impacts could occur through soil erosion and runoff from the surrounding areas; however, those impacts would be minimized through the use of BMPs as described above. No other impacts to wetlands would be anticipated as a result of construction and operation of the solar facility. Due to the project siting requirements described above in Section 2.3, TVA has determined that there is no practicable alternative to these wetland impacts. The action is consistent with the requirements of EO 11990, Protection of Wetlands.

Due to the avoidance of wetlands and streams, the use of BMPs to avoid sedimentation, and the relatively low quality of the wetlands and streams themselves, impacts to on-site wetlands and ephemeral streams would be insignificant.

River Bend submitted a letter requesting a jurisdictional determination (JD) from the USACE Nashville District on March 16, 2015. The USACE conducted a site visit with Jackson Group biologists on 24 June 2015. Following the site visit, the initial wetlands and waterbodies maps were revised and an updated JD request was submitted to the USACE on July 7, 2015. The revised maps (Figures 6 and 10) proposed that the seven ephemeral streams were the only jurisdictional features located on the project site. The USACE Preliminary Jurisdictional Determination dated August 24, 2015, concluded that the seven on-site streams may be jurisdictional waters of the US and that impacts to these waters should be avoided whenever practicable. Although the stock pond and isolated depressional area are non-jurisdictional wetlands, they will be avoided during project construction and operation.

No impacts to wetlands would be anticipated to result from the proposed transmission work in the ROW stretch between existing structures 92 and 109 (Figure 2). Section 2.2.3.1 describes the proposed methods of vegetation removal in SMZs and wetlands. TVA ROW Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, Transmission Construction Guidelines Near Streams (Appendices A, B and C), and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (Muncy 2012) would provide guidance for clearing and construction activities.

Wet Weather Conveyances (WWCs)

The October 2014 wetland delineation and waterbody survey of the site also identified and mapped four WWCs (shown as ‘swales’ on Figures 6 and 10) constructed during past agricultural practices to drain and isolate water from the fields. Vegetation associated with the WWCs is comprised of Japanese Honeysuckle, multiflora rose, and various upland grass species. All four WWCs were determined not to meet wetland criteria, nor did they meet the definition for classification as a jurisdictional stream channel. There were no ordinary high water marks or other hydrologic indicators, no hydrophytic vegetation, and no hydric soils present in any of the WWCs. These findings were confirmed by the USACE during their site visit on June 24, 2015. The delineated WWCs are ephemeral and only convey stormwater, but not frequent enough nor for long enough durations for wetland or stream creation.

BMPs, including erosion/sediment controls and care during tree clearing, would be used to minimize potential for erosion and overall drainage patterns would be maintained.

3.4 BIOLOGICAL RESOURCES

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

The project site is located in Lauderdale County, Alabama near the Town of Oakland, within the Tennessee River watershed. This area lies within the Interior Plateau Level III Ecoregion and contains four Level IV subecoregions. The project site is within the Eastern Highland Rim subecoregion. This region contains Mississippian-age limestone, chert, shale, and dolomite. In many areas, springs, sinks, and caves have formed by dissolution of the limestone. In the project area, streams flow down from the Pottsville Escarpment, across the Moulton Valley and through Little Mountain to the Tennessee River. The flatter areas surrounding the Tennessee River have very deep, well-drained, reddish, soils that are intensively farmed. Generally, the natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions to the east. Much of the original bottomland hardwood forest has been inundated by impoundments (Griffiths et.al. 2001).

A desktop survey was performed prior to field investigations of the proposed Project area. Wildlife, vegetation, and threatened and endangered (T&E) species were researched during the desktop survey and verified through the field investigations (September and October 2014). Results of desktop investigations and field evaluations are described in this section.

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

- NEPA (42 U.S.C. §§ 4321-4347);
- The Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544);
- The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712); and
- The Bald and Golden Eagle Protection Act.

Desktop research regarding the Alabama Department of Conservation and Natural Resources (ADCNR) and the USFWS was conducted to obtain the current county list and a preliminary list of known occurrences of T&E species in Lauderdale County, Alabama. USFWS must be consulted during the planning stages of a project with a federal nexus and the potential to affect T&E species. Depending on the nature of potential impacts to listed species, consultation may be informal or formal. Formal consultation is required if the Proposed Action has the potential to adversely affect listed species or their critical habitat.

In letters dated February 24, 2015, TVA initiated consultation with both the USFWS and the Alabama Division of Wildlife and Freshwater Fisheries (Appendix G).

3.4.1 Affected Environment – Biological Resources

The existing biological resources at the Lauderdale project site include vegetation and wildlife, as well as potential rare, threatened, or endangered species.

3.4.1.1 Vegetation

The Highland Rim ecoregion is generally characterized by forest communities that are typical of both the Midwestern states and the southeastern states. One of these two forest communities is comprised of sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), blue ash (*Fraxinus quadrangulata*), chinquapin oak (*Quercus muehlenbergii*)**,** Shumard oak (*Quercus shumardii*), southern shagbark hickory (*Carya ovata*), redbud (*Cercis canadensis*)**,** hackberry (*Celtis occidentalis*), and eastern red cedar (*Juniperus virginiana*). The other forest community is characterized by an assemblage of black (*Quercus velutina*), white (*Quercus alba*), and post (*Quercus stellata*) oaks, mockernut (*Carya tomentosa*) and pignut (*Carya glabra*) hickories, tuliptree (*Liriodendron sp.)*, flowering dogwood (*Cornus florida*), and loblolly pine (*Pinus taeda*). The forest types are dictated by areas of varying soil acidity. There are many wetlands, characterized by species found in the Highland Rim such as bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), river birch (*Betula nigra*), cherrybark oak (*Quercus pagoda*), swamp chestnut oak (*Quercus michauxii*), green ash (*Fraxinus pennsylvanica*), sweet gum (*Liquidambar styraciflua),* silver maple (*Acer saccharinum*), and sycamore (*Platanus occidentalis*) (Encyclopedia of Alabama 2014).

The entire 645-acre site was surveyed for wetlands/streams and protected species habitat in October of 2014 (report provided in Appendix F). It is predominantly farmed with soybeans, cotton and corn. There are a few stands of trees which are dominated by oak and red maple. Mimosa (*Albizia julibrissin*) was present along field edges and willow (*Salix* sp.) was found within the fields. There is a pine (*Pinus* sp.) stand near the northwest portion of the project area. Two wetlands, one relic wetland, seven streams and four swales were observed on the project site during the survey. All three wetlands were man-made farm ponds. Wetland vegetation found in the wetlands included sugar-berry trees, white oak and goldenrod (*Solidago sp*.). Non-wetland plants included black cherry (*Prunus serotina*), American pokeweed (*Phytolacca americana*), muliflora rose (*Rosa muliflora*), and various upland grasses (*Fescue sp.*) (Jackson Environmental 2014).

3.4.1.2 Wildlife

Highland Rim subecoregion mammals include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor)*, gray squirrel (Sciurus carolinensis), fox squirrel (Sciurus niger), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), pine vole (*Microtus pinetorum*), short-tailed shrew (*Blarina brevicauda*), and cotton mouse (*Peromyscus gossypinus*). Game birds in the region include the turkey (*Meleagris gallopavo*), the ruffed grouse (*Bonasa umbellus*), the bobwhite (*Colinus virginianus*), and the mourning dove (*Zenaida macroura)*. Common songbirds are the red-eyed vireo (*Vireo olivaceus*), northern cardinal (*Cardinalis cardinalis*), tufted titmouse (*Baeolophus bicolor*), wood thrush (*Hylocichla mustelina*), summer tanager (*Piranga rubra*), blue-gray gnatcatcher (*Polioptila caerulea*), hooded warbler (*Setophaga citrina*), and Carolina wren (*Thryothorus ludovicianus*). Reptiles include the box turtle (*Terrapene carolina*), the common garter snake (*Thamnophis sirtalis*), and the timber rattlesnake (*Croatus horridus*). Endemics to this subecoregion include the Sequoyah slimy salamander (*Plethodon sequoyah*), the Kiamichi slimy salamander (*Plethodon kiamichi*), the goldstripe darter (*Etheostoma parvipinne)*, and the blackspot shiner (*Notropis atrocaudalis*). Species extirpated or extinct from this habitat are the red wolf (*Canis rufus),* the ivory-billed woodpecker *(Campephilus principalis)*, Bachman's warbler (*Vermivora bachmanii)*, the passenger pigeon (*Ectopistes migratorius),* and the Carolina parakeet (*Conuropsis carolinensis)* (USDA 1993).

Many of these species are likely to be found in non-disturbed forested areas near the project site; however, as the majority of the project site is actively farmed, overall species diversity is low and most species present are widespread, adapted to open field habitats, and relatively common in the area.

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

Rare, threatened and endangered (T&E) species are regulated by both the federal and state governments (see Section 3.4 above). Desktop research with the ADCNR and USFWS revealed that there are 15 federally listed endangered species and two federally listed threatened species in Lauderdale County Alabama. Fifteen of these species are aquatic and are not likely to be present on the site. Additionally, there are 34 fish species, 14 amphibian species, 22 reptile species, and 15 mammal species protected by the State of Alabama. It is unlawful to take, capture or kill any of these species (ADCNR 2015).

Federally Listed Species

A desktop database search and aerial/street-view photograph review was conducted to identify the types of habitats present on the proposed project site, including habitats that potentially could support sensitive and listed species. A reconnaissance-level survey of biological resources on the site was conducted on 22 September 2014 (access to a portion of the site was denied). The focus of the site visit was to observe the general characteristics of the land cover, vegetation communities, and wildlife habitats currently present within and adjacent to the site and, in particular, to support a preliminary evaluation of the potential for special status species to occur on the site. This section summarizes the evaluation of those biological resources that potentially may constrain development of the site.

The federally listed species that were identified as having the potential to occur in the area are the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis),* dromedary pearlymussel (*Dromus dromas*), pink mucket (*Lampsilis abrupta*), sheepnose mussel (*Plethobasus cyphyus*), and spectaclecase (*Cumberlandia monodonta*) (USFWS 2014a). An additional species that was recently listed and has a range that encompasses the site is the northern long-eared bat (*Myotis septentrionalis*). There are no designated critical habitats in the project area (USFWS 2014b).

Gray bat

The endangered gray bat roosts almost exclusively in caves throughout the year, using caves with different characteristics in winter and summer. It hibernates in caves in large numbers in winter months and migrates to warmer caves to form summer maternity or bachelor colonies. Gray bat foraging habitat is closely associated with rivers, lakes, and other large bodies of water over which it forages for mostly aquatic insects (NatureServe Explorer 2014a, USFWS 2009). Because the project site is comprised almost entirely of agricultural land with no known caves on or within 3 miles of the site, and no large rivers or lakes near the site (Pickwick Reservoir on the Tennessee River is approximately four miles to the south and west of the site), it is very unlikely that the gray bat would occur on or adjacent to the site.

Indiana bat

The endangered Indiana bat hibernates in caves and mines in winter and migrates to summer habitats in wooded areas. The large winter colonies disperse in spring, and reproductive females form smaller maternity colonies in wooded areas. Males and non-reproductive females roost in trees but typically do not roost in colonies. The range of the Indiana bat extends from the northeast through the east-central United States (USFWS 2015a). The Indiana bat typically forages in semi-open forested habitats and forest edges as well as riparian areas along river and lake shorelines (USFWS 2015a, NatureServe Explorer 2014b). Suitable summer roosting habitat requires dead, dying, or living trees of sufficient size with sufficient exfoliating bark; multiple roost sites are generally used. Primary summer roosts are typically behind the bark of large, dead trees, particularly those that are in gaps in the forest canopy or along forest edges so that they receive sufficient sun exposure (USFWS 2015a).

The proposed project site is almost entirely agricultural land; there are no known caves on or in the vicinity of the site for use in winter, and there are no large tracts of forest or riparian areas to provide suitable foraging areas. A few large trees occur in small wooded tracts and narrow strips along roads and fencerows.

Northern long-eared bat

The northern long-eared bat was not included among the listed species identified by USFWS as potentially occurring in the vicinity of the site; however, the northern long-eared bat was officially listed as threatened effective May 4, 2015, and the project site is within the range of this species. The range of the northern long-eared bat includes 39 states across much of the eastern and north-central US. Its recent listing as federally threatened is based on the impacts from white-nose syndrome on a large proportion of the population, particularly in the northeastern United States. The northern long-eared bat spends the winter hibernating in caves. In summer, it roosts singly or in colonies in live or dead trees beneath bark, in cavities, or in crevices. It also has been found, though rarely, roosting in barns, sheds, or other structures. The northern long-eared bat forages for flying insects by flying through the understory of forested hillsides and ridges (USFWS 2014b).

The proposed project site is almost entirely agricultural land; there are no known caves on or in the vicinity of the site for use in winter, and there are no large tracts of forest on hillsides or ridges on the site that would provide preferred foraging habitats. However, there is a small possibility that northern long-eared bats could roost in trees within small wooded tracts at the site or in the abandoned houses and barns present on the site. Bats may be affected if displaced from a structure prior to its demolition.

In October 2014, a Phase 1 bat summer habitat assessment was conducted on the site by Jackson Environmental Consulting Services, LLC (Jackson Environmental) in order to ascertain the availability of suitable summer habitat for Indiana and northern long-eared bats (Appendix F). Surveys were conducted in accordance with the 2013 Revised Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2013).

Three wooded sites were surveyed within the project area and four potential roost trees were identified, all along the northern border of the site. There was a small ephemeral stream running through the middle of Site 1 and there was an ephemeral stream in Site 3. There were no potential roost trees found within the pine stand. Figures 6 and 10 show the locations of the potential roost sites. The survey concluded that while there were four potential roost trees, they were not deemed suitable habitat due to the highly fragmented forested area, the lack of high-quality permanent water at each site, and the heavy agricultural disturbance surrounding the trees (Jackson Environmental 2014).

<u>Mussels, Mucket and Spectaclecase</u>

In Alabama, the dromedary pearlymussel historically occurred in the Tennessee River downstream of Muscle Shoals. It has not been reported in Alabama since the 1930s. The species typically lives in sand and gravel substrates of riffles that occur at shoals in moderate-current velocities of rivers. It has also been found in deeper, slower-moving waters with firm rubble, gravel, and stable, clean substrates (NatureServe Explorer 2014c). The pink mucket prefers large rivers, dwelling in fast-flowing waters with strong currents. It has been found in deeper locations in some impoundments with river-lake conditions and slower currents (NatureServe Explorer 2014d). The sheepnose mussel occurs in medium to large rivers, and it has been found in reservoirs. It usually is found in deep water in slight to swift currents with mud, sand, or gravel substrates. It can be associated with riffles in gravel/cobble substrates (NatureServe Explorer 2014e). The spectaclecase occurs in large rivers where they live in areas sheltered from the main force of the river current. Spectaclecase mussels often cluster in firm mud and in sheltered areas, such as beneath rock slabs (NatureServe Explorer 2014f). Suitable habitat for these species does not exist on or adjacent to the potential project site. The small on-site drainage ways and isolated ponds are not suitable habitats for these mollusks.

Summary

Of the six federally listed species identified by the USFWS as having the potential to occur in the vicinity of the proposed project in Lauderdale County, none are considered 'likely to occur' on the site. Four potential roost trees for Indiana and northern long-eared bats were identified along the northern border of the site. Due to site-specific conditions, these trees were determined to not provide suitable habitat for the bats.

State Listed Species

State-listed animal species in Alabama are assigned a legal listing status of state protected. In addition, all mussel species not listed as a protected species are partially protected by other regulations (partial status). The species in Lauderdale County that have a state status are shown in Table 3.4-1. The state protected (SP) species include the six federally listed species discussed above as well as nine birds, two snakes, one turtle, two salamanders, ten fish, one snail, and 27 freshwater mussels. In addition, there are 29 mussels in the county that have a partial status (PS).

Table 3.4-1. State-Listed Species Potentially Occurring in Lauderdale County, Alabama

Scientific Name	Common Name	Federal Status	State Status
Mammals			
Myotis grisescens	Gray bat	LE	SP
Myotis sodalis	Indiana bat[13]	LE	SP
Birds			
Asio flammeus	Short-eared owl		SP
Chondestes grammacus	Lark sparrow		SP
Falco peregrinus	Peregrine falcon		SP
Falco sparverius	American kestrel		SP
Setophaga cerulea	Cerulean warbler[2]		SP
Setophaga petechia	Yellow warbler		SP
Thryomanes bewickii	Bewick's wren[2]		SP
Tyrannus forficatus	Scissor-tailed flycatcher		SP
Vireo gilvus	Warbling vireo		SP
Reptiles			
Macrochelys temminckii	Alligator snapping turtle		SP
Masticophis flagellum	Coachwhip		SP
Pituophis melanoleucus melanoleucus	Northern pinesnake		SP
Amphibians			
Aneides aeneus	Green salamander		SP
Cryptobranchus alleganiensis	Hellbender		SP

Table 3.4-1. State-Listed Species Potentially Occurring in Lauderdale County, Alabama

Scientific Name	Common Name	Federal Status	State Status
Fishes			
Elassoma alabamae	Spring pygmy sunfish[1]		SP
Erimonax monachus	Spotfin chub	LT, XN[3]	SP
Etheostoma boschungi	Slackwater darter	LT	SP
Etheostoma neopterum	Lollipop darter		SP
Etheostoma tuscumbia	Tuscumbia darter		SP
Percina burtoni	Blotchside logperch[2]		SP
Polyodon spathula	Paddlefish		SP[4]
Scaphirhynchus platorynchus	Shovelnose sturgeon[2]		SP[5]
Speoplatyrhinus poulsoni	Alabama cavefish[1]	LE	SP
Typhlichthys subterraneus	Southern cavefish		SP
Freshwater Mussels			
Actinonaias ligamentina	A mucket[7]		PS
Actinonaias pectorosa	Pheasantshell[2]		PS
Alasmidonta marginata	Elktoe[2]		PS
Anodonta suborbiculata	Flat floater		PS
Arcidens confragosus	Rock pocketbook		PS
Cumberlandia monodonta	Spectaclecase	LE	SP
Cyprogenia stegaria	Fanshell	LE	SP
Dromus dromas	Dromedary pearlymussel	LE, XN[6]	SP
Elliptio dilatata	Spike		PS
Epioblasma ahlstedti	Duck river dartersnapper	LE[6]	SP
Epioblasma brevidens	Cumberlandian combshell[2]	LE, XN[8]	SP
Epioblasma capsaeformis	Oyster mussel[2]	LE, XN[8]	SP
Epioblasma florentina	Yellow blossom[2]	LE, XN[8]	SP
Epioblasma obliquata	Catspaw[2]	LE, XN[9]	SP
Epioblasma triquetra	Snuffbox[2]	LE	PS
Fusconaia cor	Shiny pigtoe[2]	LE, XN[9]	SP
Fusconaia cuneolus	Fine-rayed pigtoe[2]	LE, XN[9]	SP
Fusconaia subrotunda	Longsolid		PS
Hemistena lata	Cracking pearlymussel[2]	LE, XN[9]	SP
Lampsilis abrupta	Pink mucket	LE	SP
Lampsilis fasciola	Wavy-rayed lampmussel		PS
Lampsilis ovata	Pocketbook		PS
Lampsilis virescens	Alabama lampmussel[2]	LE, XN[9]	SP

Table 3.4-1. State-Listed Species Potentially Occurring in Lauderdale County, Alabama			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Lasmigona complanata	White heelsplitter		PS
Lasmigona costata	Fluted-shell		PS
Lemiox rimosus	Birdwing pearlymussel	LE, XN[6]	SP
Leptodea leptodon	Scaleshell[2]	LE	SP
Ligumia recta	Black sandshell		PS
Medionidus conradicus	Cumberland moccasinshell[2]		SP
Obovaria olivaria	Hickorynut[2]		PS
Obovaria retusa	Ring pink[2]	LE	SP
Obovaria subrotunda	Round hickorynut[2]		PS
Pegias fabula	Little-wing pearlymussel[2]	LE	SP
Plethobasus cicatricosus	White wartyback	LE	SP
Plethobasus cooperianus	Orange-foot pimpleback[2]	LE	SP
Plethobasus cyphyus	Sheepnose	LE	SP
Pleurobema clava	Clubshell[2]	LE, XN[8]	SP
Pleurobema cordatum	Ohio pigtoe		PS
Pleurobema oviforme	Tennessee clubshell		PS
Pleurobema plenum	Rough pigtoe	LE	SP
Pleurobema rubrum	Pyramid pigtoe		SP
Pleurobema sintoxia	Round pigtoe		SP
Pleuronaia barnesiana	Tennessee pigtoe[2]		PS
Pleuronaia dolabelloides	Slabside pearlymussel[2]	PE	SP
Potamilus ohiensis	Pink papershell		PS
Ptychobranchus fasciolaris	Kidneyshell		PS
Ptychobranchus subtentum	Fluted kidneyshell[2]	PE	SP
Quadrula cylindrica cylindrica	Rabbitsfoot[2]	PT	SP
Quadrula intermedia	Cumberland monkeyface[11]	LE, XN[10]	SP
Quadrula metanevra	Monkeyface		PS
Strophitus undulatus	Creeper[2]		PS
Toxolasma cylindrellus	Pale lilliput[2]	LE	SP
Toxolasma lividum	Purple lilliput		PS
Toxolasma parvum	Lilliput		PS
Truncilla donaciformis	Fawnsfoot		PS
Truncilla truncata	Deertoe		PS
Villosa iris	Rainbow		PS
Villosa taeniata	Painted creekshell		PS

Table 3.4-1. State-Listed Species Potentially Occurring in Lauderdale County, Alabama

Scientific Name	Common Name	Federal Status	State Status
Villosa trabalis	Cumberland bean[2]	LE, XN[9]	SP
Villosa vanuxemensis	Mountain creekshell		PS
Freshwater Snails			
Athearnia anthonyi	Anthony's river snail[1]	LE, XN[12]	SP

State Status Abbreviations:
SP – State Protected
PS – Partial Status – mussels

Federal Status Abbreviations:
LE – Listed Endangered
LT – Listed Threatened
PE – Proposed Endangered
PT – Proposed Threatened
XN – Experimental population, Nonessential (experimental reintroduced population)

Footnotes:
1 Alabama endemic.
2 Historic occurrence.
3 LT - Listed Threatened range-wide except where listed as Experimental Population, Non-essential. There are three locations where it is designated Experimental but only one (Shoal Creek) includes portions of Alabama. XN – Experimental Population, Nonessential TN-AL: Nonessential experimental population that would extend from the mouth of Long Branch, Lawrence County, TN (Shoal Creek mile (CM) 41.7 (66.7 kilometers (km)), downstream to the backwaters of the Wilson Reservoir at Goose Shoals, Lauderdale County, AL (approximately CM 14 (22 km)), and would include the lower 5 CM (8 km) of all tributaries that enter this reach.
4 *Polyodon spathula* is not included in the list of protected species of the Nongame Species Regulation (Regulation 220-2-.92), but is protected by Regulations 220-2-.94 Prohibition of Taking or Possessing Paddlefish (Spoonbill) and 220-2-.43 Unlawful to Willfully Waste Paddlefish.
5 *Scaphirhynchus platorynchus* is not included in Nongame Species Regulation 220-2-.92 but all species of sturgeon are protected by Regulation 220-2-.26(4).
6 Possibly occurs in the county, documented from Shoal Creek just upstream of the AL and TN state line in Lawrence County, Tennessee.
7 Listed Endangered rangewide by USFWS except where listed as Experimental Populations; XN – AL: free-flowing reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale counties, AL, where a trial transplant was conducted in 2003.
8 *Epioblasma capsaeformis* was listed as endangered under the Endangered Species Act in 1997, including the Duck River population. The Duck River population was described as a new species, *E. ahlstedti*, by Jones and Neves in 2010.
9 Listed Endangered rangewide by USFWS except where listed as Experimental Populations; XN – AL: free-flowing reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale counties, AL, but no reintroductions have been made yet.
10 Listed Endangered rangewide by USFWS except where listed as Experimental Populations; XN – Experimental Population, Non-Essential, AL: free-flowing reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale counties, AL, but no reintroductions have been made yet.
11 Historic occurrence.
12 Listed Endangered rangewide by USFWS except where listed as Experimental Populations; XN – AL: free-flowing reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale counties, AL.
13 Possible occurrence

Source:
Alabama Natural Heritage Program – Auburn University. 2014. Rare, Threatened, and Endangered Species and Natural Communities Documented in Lauderdale County, Alabama. Accessed at: http://www.alnhp.org/query_results.php on 9/19/2014.

The majority of these state-listed species are aquatic and lack suitable habitat on or near the project site. The terrestrial species that potentially could occur in the habitats types present on the site include four birds, the short-eared owl, lark sparrow, American kestrel, and scissor-tailed flycatcher, and one snake, the coachwhip. The site currently is used for intensive agriculture, principally for production of corn and cotton. The four bird species included as having the potential for occurrence at the site utilize open country habitats. However, their preferred habitats principally are grasslands, prairies, marshes, and weedy fields (Dunn and Alderfer 2006), not intensively cultivated croplands. Although the short-eared owl, lark sparrow, American kestrel, and scissor-tailed flycatcher potentially could use the site occasionally, they would not be expected to use the site regularly as habitat or to be affected by the proposed project. Although the coachwhip may occur occasionally in modified habitats such as agricultural fields, its preferred habitats include open pine forest, sandhill scrub, old fields, and prairies (Willson 2014). Therefore, the potential for the coachwhip to occur on the site is minimal.

Of the 87 species with a State Protected or partial status (mussels) in Lauderdale County, only species that may use terrestrial habitats similar to those of the upland site considered for the proposed project have the potential to be affected. Comparison of the habitat preferences of the five species that prefer open habitats with the habitats available on this active agricultural site indicates that these highly mobile species could occasionally visit the site but would not be expected to depend on the relatively low quality habitat in these areas.

Migratory Birds

The USFWS (2014a) identified 11 species of migratory birds of concern (i.e., birds of conservation concern, which are species not already federally listed that represent the Service's highest conservation priorities) that may have the potential to occur in the vicinity of the proposed project site. These species are listed in Table 3.4-2. The site generally does not provide suitable habitat for these species. As noted in Section 3.4.1.3, the American kestrel may use the site to some extent, but it would not provide preferred habitat. Similarly, the sedge wren prefers wet grassy fields or marshes and could use small wetland areas on the proposed site during migration (the project site is not within the breeding or wintering range of the sedge wren). Both the kestrel and sedge wren have suitable habitat available in the vicinity that appears superior to that on the project site. Most other species on the list require woodland, swamp, or marsh habitats that do not occur on the site. The site currently is intensively cultivated for agriculture and does not provide quality nesting habitat for birds.

During the winter, the agricultural fields are likely to be used by blackbirds and waterfowl feeding on crop residues. The seasonal ponds on-site and on adjacent properties are used by waterfowl in the winter as well. The proposed project site is located near Pickwick Reservoir, a large body of water, which would be much more suitable for waterfowl.

Table 3.4-2.
Migratory Bird Species of Concern Potentially Occurring in the Vicinity of the Proposed Project Site

Species Name	Seasonal Occurrence in Project Area
American kestrel (*Falco sparverius* ssp. *paulus*)	Year-round
Bachman's sparrow (*Aimophila aestivalis*)	Breeding
Bald eagle (*Haliaeetus leucocephalus*)	Year-round
Blue-winged warbler (*Vermivora pinus*)	Breeding
Chuck-will's-widow (*Caprimulgus carolinensis*)	Breeding
Least bittern (*Ixobrychus exilis*)	Breeding
Rusty blackbird (*Euphagus carolinus*)	Wintering
Sedge wren (*Cistothorus platensis*)	Migrating
Swainson's warbler (*Limnothlypis swainsonii*)	Breeding
Wood thrush (*Hylocichla mustelina*)	Breeding
Worm-eating warbler (*Helmitheros vermivorum*)	Breeding

***Source**: USFWS 2014a*

Key Cave National Wildlife Refuge

The Key Cave National Wildlife Refuge is located in Lauderdale County, Alabama, approximately five miles southeast of the project site. It is in a limestone karst area with numerous sinkholes and cave systems. It is a 1,060-acre tract that currently has 295 acres in row crop production, 327 acres in early successional fields or native grasses, 122 acres of newly planted hardwoods, 30 acres of restored grassland, 16 acres of shallow water habitat and 256 acres of upland oaks and hickories (USFWS 2015b). The Alabama Cavefish is found in Key Cave, the only known location where this endangered species is found (USFWS 2015c). It is a cave obligate. Their likely source of food in the cave is the excretions from the gray bat colony which is also located in the cave. The primary producers in the cave are two species of cave crayfish, which are likely to be eaten by the cavefish. The timing and cues for reproduction are not known, but the cavefish does incubate its young in brachial chambers as do other cavefish species (USFWS 1974). Due to the presence of two endangered species (the cavefish and the gray bat), the cave is not open to the public. The rest of the refuge is accessible; however, there is no visitor center or any visitor services. The extent of the groundwater recharge area for Key Cave has been mapped and does not include the project site (USFWS 2015b).

3.4.2 Environmental Consequences – Biological Resources

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

3.4.2.1 No Action Alternative

Vegetation

Under the No Action Alternative, there would be no impacts to the existing vegetation on the site resulting from project-related actions by TVA or River Bend. It is assumed that the actively farmed areas on the project site would continue to be agricultural. If these practices were to be discontinued, the property would likely gradually shift from agricultural fields to an open grassland and shrub system and eventually to a Highland Rim forest system as described in the existing conditions section.

Wildlife

Under the No Action Alternative, impacts to wildlife would be similar to those occurring to vegetation. If current practices continue, the agricultural fields and small forested areas would continue to support wildlife which generally occurs in this habitat. If these current practices were abandoned, over time, the wildlife type would shift toward that which prefers forested areas.

Rare, Threatened, and Endangered Species

Under the No Action Alternative, no direct or indirect impacts to rare, T&E species are anticipated as a result of Project-related actions by TVA or River Bend. No habitats potentially supporting T&E would be disturbed or destroyed. However; as with vegetation and wildlife, indirectly, over time, shifts in habitat types caused by either the continuation or abandonment of human practices on project site could result in impacts to T&E. For example, a shift towards a more forested vegetative cover would make it more habitable for forested T&E species, such as bats, but whether or not these species would be found there in the future is unknowable.

3.4.2.2 Proposed Action

Vegetation

Under the Proposed Action, a solar facility would be constructed on the project site with direct impacts to vegetation. Clearing and grading would be conducted to establish new access roads, staging/laydown areas, concrete pads, and the solar array field. There would be no excess excavated material from project construction; soil excavation and fill requirements would be balanced. Approximately 513 acres of agricultural fields and scattered tall shrubby vegetation would be cleared where the PV arrays would be constructed (see Figure 4). This acreage does not include other sensitive biological areas that could be encountered during the mobilization phase of construction. Installation of the arrays would require posts to be driven into the ground, and then subsequent trench and fill activities for the underground wiring. The trenches would be narrow and shallow, and revegetation would occur in these areas post-construction. Following construction, the solar farm would be maintained as described in Section 2.2.4 to prevent vegetation from growing taller than about 2 ft. This would result in the long-term conversion of most of the project area from seasonal row crops to a mix of grass and herbaceous vegetation.

Construction would be sequenced to minimize the exposure time of the disturbed areas. Silt fence and 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 and reclaimed road sections, office/laydown areas, reclaimed ditch areas, and other project-specific locations would be seeded post-construction. 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 NRCS office would be used. If conditions require, soil stabilization by mulch or sprayable fiber mat could be necessary. If the area seeded is a steep slope (6:1 or greater), hydro seeding may be employed as an alternative. Where hay mulch is required, it would be applied at three (3) tons per acre, well-distributed over the area. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the pre-construction conditions or the site is stable as described in the River Bend Solar CBMPP.

Direct impacts to forested areas would be minimal under the Proposed Action as most of the trees are located within the 50-foot buffer areas associated with the on-site waterbodies or the mowed sections of the site. Construction within these non-required buffers would be avoided to the extent possible, but some work would occur within the buffer zones. The small stand of trees in the northwest corner of the project site would be removed during the grading process. Additionally, minor impacts may occur if trees taller than 65 ft would shade the PV arrays and in locations where trees would interfere with the placement of a structure or the detention basin(s). The acreage of wooded area that would be cleared for this project is minimal compared to the amount of similar habitat present in the project vicinity.

Taking into consideration the large amount of similar habitat and land cover in the area regionally and locally, as well as the previously-disturbed nature of the project site, the clearing and grading of approximately 160 acres of existing vegetation, and the mowing/surface preparation of 353 acres would be considered a minor impact. The project site consists of recently-cultivated agricultural land. As such, the fields have been cleared and revegetated with crops on a regular basis. Species composition is limited due to agricultural practices; however, the re-vegetation and seeding process could potentially increase the number of plant species on the project site. In addition, the surrounding area consists of very similar agricultural vegetative habitats and the impacts of converting 645 acres of vegetation in this context would be relatively small.

Indirect impacts are possible if the existing vegetation is part of a larger system which relies on these particular plant communities for regional propagation and genetic diversity. Due to the large amount of similar habitat and plant communities surrounding the property; however, this impact is unlikely or at least would be very minor. Overall, although much of the existing vegetation on the property would be destroyed and converted to a new type of community, it would only constitute a minor impact due to the prevalence of similar habitats and ecosystems in the surrounding region. Additionally, grasses, forbs, herbs and possibly small shrubs would be allowed to re-colonize the area once construction is complete, although they will be maintained in order to prevent interference with the solar arrays. Therefore, species composition may change resulting in insignificant impacts to regional plant communities, while the site would be vegetated year-round with early successional, maintained grassland.

Wildlife

Direct impacts to wildlife are also anticipated under the Proposed Action. Much of the wildlife living on the project site in areas which would be mowed and graded and converted to solar arrays would be displaced by construction activities. Following the completion of construction and site revegetation, some species adapted to grass and herbaceous fields such as field mice, common yellowthroat, and red-winged blackbird would likely reoccupy the site. The types of species occupying the existing agricultural fields and those potentially inhabiting the proposed solar array habitat are likely to be similar. Minor shifts in species composition may occur due to the change in disturbance regime and the shift to periodically mowed grass and herbaceous fields. Species occupying the cleared wooded areas would be permanently displaced. These wooded areas are very small and are highly fragmented, limiting the diversity of the wildlife species they support. They also make up a very small portion of the forested habitat in the surrounding area.

Although the PV panels are designed to be non-reflective, migratory birds can occasionally mistake solar installations for bodies of water and attempt to land on the panels, sometimes resulting in injury or death. This is more likely to occur in arid regions where waterbodies are sparse. Both birds and bats can and have been found to collide with PV panels, but the likelihood and significance of such potential collisions would be low, given conditions at this particular site (poor habitat, lack of perennial on-site waterbodies). Overall, adverse direct impacts to migratory birds are not anticipated under the Proposed Action.

Overall, direct impacts to wildlife would be permanent but minor on the project site. These impacts would be minimized by the ability of mobile species to colonize adjacent similar habitats surrounding the project site. Additionally, small species would be able to recolonize the project site after construction was complete. Indirect impacts would be temporary and very minor as existing individuals colonized adjacent habitats.

Rare, Threatened and Endangered Species

Under the Proposed Action, no impacts to federally listed threatened and endangered species are anticipated. No federally listed species were observed during field surveys on or in the immediate vicinity of the project site. Potential summer roost habitat for the northern long-eared bat and the Indiana bat is present (four potential roost trees) on the project site (Figures 6 and 10). None of these trees, however, were determined to be suitable summer roost habitat for the two bats. Suitable habitat for other federally listed species is not present on the project site or in its immediate vicinity. The construction and operation of the proposed solar facility is not expected to affect habitats or land uses (Section 3.1.2.2) in the surrounding area and therefore no indirect effects to federally listed species are anticipated. In accordance with Section 7 of the ESA, TVA consulted with the USFWS in February 2015 over the effects of its proposed action on listed species. In a response dated March 24, 2015 (Appendix G), USFWS stated that no federally listed species/critical habitat are known to occur in the project area, and therefore, no impacts to fish and wildlife resources would result from the project.

The Proposed Action could result in a small loss of habitat for a few State-listed species occupying field habitats. The quality of field habitats on the project site for these species is low to moderate and suitable habitat is common in the surrounding area. Therefore impacts to these species would be insignificant. TVA received a response from the Alabama Department of Conservation and Natural Resources (ADCNR) on April 1, 2015 regarding the proposed project's potential impacts on State-listed species. The ACDNR stated that the Proposed Action would not impact any State- or federally listed species. The ACDNR further advised that any impacts to wetlands or streams, including siltation, stream realignment or flow diversion or interruption should be mitigated with guidance from the Nashville office of the USACE (Appendix G).

The Key Cave Wildlife Refuge is located approximately five miles southeast of the proposed project site. Although T&E species are known to exist in the Key Cave and a diverse wildlife population occurs on the refuge, no impacts are likely to occur due to the distance from and lack of connection to the project activities.

3.5 VISUAL RESOURCES

3.5.1 Affected Environment – Visual Resources

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

The Project Area is near the unincorporated Town of Oakland. The regional character is mostly rural, with agricultural fields, rolling hills, forested areas, and generally small towns. Attributes associated with the Town of Oakland would include many single-family homes with yards and trees, a central road with small shops and businesses, schools with large grounds and athletic areas, and small single-lane roads leading into the more spread out residential areas and then on to the rural areas. The town appears nestled in the midst of a peaceful and harmonious landscape of undulating hills covered in the soft natural tones of agricultural fields and forested areas on both the hill tops and valleys. Florence is a more urbanized city, part of a larger highly developed area which includes Muscle Shoals, Tuscumbia and Sheffield. Photo 3.5-1 illustrates the bucolic nature of the general Oakland area.

Photo 3.5-1. View of a distant church near the River Bend Solar Project Site

The project site is mostly agricultural land, with actively farmed and small shrubby and forested areas present. The viewsheds constitute an almost completely agricultural setting, with very few man-made attributes. Man-made items include a home on an adjoining property, some abandoned buildings and a farm equipment building on-site and dirt roads traversing the parcel. Overall, in the project vicinity, man-made items are generally tucked into forested areas or are mostly visually unobtrusive (Photo 3.5-1).

The site has a gentle undulating topography reminiscent of pastureland. The natural color tones and unobtrusive man-made visual disturbances can create a feeling of harmony and tranquility (Photo 3.5-2). Although the uniformity of the croplands is a man-made visual disturbance, it is still an appealing view due to the colors and topography. The more open areas with the forested areas adjacent present an attractive contrast of colors and shapes. The abandoned buildings are screened by small trees and shrubs, and are visually unobtrusive due to their coloring and low stature (Photo 3.5-3).

Photo 3.5-2: View of the River Bend Solar Site

Photo 3.5-3: View of one of the abandoned buildings on the project site

The entire project site is agricultural with small stands of trees following the ephemeral streams between fields. Due to the farming practices, visual appearance will vary over the year; some areas will appear disturbed and weary when the crops have been harvested. Photo 3.5-4 illustrates the appearance of a harvested field on the project site. Photo 3.5-5 illustrates visual characteristics on the site when the fields are in the growing stages. During this portion of the agricultural process, the view would feel more like a natural setting, with green rolling hills and trees in the distance.

Photo 3.5-4: View from CR 62 of the project site showing fallow fields after corn has been harvested

Photo 3.5-5: View of the southern part of the project site, showing actively growing cotton fields with trees and hills in the distance

As a consequence of the active agriculture on the project site, an industrial aspect is inserted into the aesthetics of the site. The large farm equipment building located off CR 217 on the west side of the site is visually obtrusive in the field setting (Photo 3.5-6). The periodic arrival of large farm vehicles on-site adds to this industrial mood (Photo 3.5-7).

Photo 3.5-6: View of the farm equipment building and vehicles located on the project site

Photo 3.5-7: View of semi-trucks loading cotton on the project site

There are few residential viewpoints for the project site as very few residences are in the immediate vicinity. The site is largely visible from CR 62 on the southern boundary and CR 217 on the western boundary. Photo 3.5-8 shows the closest residence, located on CR 62 across the road from the project site. This residence is also located in the midst of agricultural fields, which blend aesthetically with the overall area. From the residence, a view of the project site is of a large farmed field, with gently undulating textures and a variety of colors depending on the season. Other potential observers of the project site would be travelers through the area along CR 62 and CR 217.

Photo 3.5-8: View of the closest residence, across CR 62 from the project site

3.5.2 Environmental Consequences – Visual Resources

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

3.5.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility and transmission line would not be constructed; therefore, no project related impacts to visual resources would result. Existing views would be expected to remain unchanged from the present mix of farmland and unused land. Impacts to visual resources are possible as the Town of Oakland and City of Florence grow. Additionally, visual changes may occur over time as vegetation on the project site changes. If the land is no longer mowed or farmed, vegetation would change from low profile plants to bushes and trees.

3.5.2.2 Proposed Action

Visual concerns are often associated with both large- and small-scale solar facilities. Construction on the project site would convert farmland, which has been actively cultivated for many years, to a commercial/industrial land use type. During the September 22, 2014 site visit, the AECOM field team assessed the potential for visual impacts from the Proposed Action on the project site. In advance of arriving on-site, AECOM prepared a visibility assessment of the project area, which identified the surrounding areas from which the Project could be visible (assuming a conservative maximum tree height of 30 ft). Although the panels would be visible from the immediate surrounding area, which is sparsely populated, the solar farm would not be visible from the Natchez Trace Parkway, located approximately 3 miles northwest of the project site.

Large portions of the site are visible from Lauderdale CR 62 (the southern boundary of the site shown in Figure 2). The topography of the area is generally flat with areas of gently rolling hills, but the relatively stable elevations and tree-lined drainages/site boundaries prevent the site from being seen from most other vantage points. Generally speaking, the western boundary of the site is tree-lined with small pockets of visibility to the corn fields beyond the trees. This roadway, Lauderdale CR 217, is not a heavily-trafficked roadway; therefore, the potential change in viewshed of the property from agriculture to a large solar facility would not be expected to result in adverse impacts.

The construction stage of the Proposed Action would create changes to the visible environment of the project area. During construction, heavy machinery would be present, changing the visual aspects of the project site, which is now an agricultural landscape with few man-made items to be seen. Additionally, vegetation would be removed or trimmed, and part of the site would be graded, changing the contouring, coloring and texture of the scenery attributes. Much of the project site during construction would appear a mixture of browns and grays due to earthmoving and concrete activities. Water would be used to keep soil from aerosolizing; therefore dust clouds are not anticipated. These visual impacts would be most noticed from CR 62 and the residence immediately south of the project site. Due to the terrain and the large amount of agricultural land in the immediate vicinity, construction and operation of the Proposed Action would be visible from up to a mile away. The area is very sparsely populated, so visual impacts during construction would be minor.

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

During the operation phase of the Proposed Action, minor visual impacts would continue to occur. Natural re-vegetation would be allowed to take place in and around the panels, new electrical lines would continue to be visible and dirt roads would be apparent throughout the solar facility. Chain-link security fencing topped with barbed wire would surround the panel arrays. Photos 3.5-9 and 3.5-10 show typical solar panel arrays.

Photo 3.5-9. Single-axis, tracking photovoltaic system with panels close to maximum tilt.

Visually, the PV panels would be dramatically different from the current scenery on the site. AECOM visited the perimeter of the site and captured photographs from all accessible boundaries. As part of the visual resource analysis AECOM created renderings of what the PV solar power plant would look like from four vantage points along CR 217 and CR 62. No key observation points (i.e., specific locations associated with sensitive receptors from which the project would be visible) to the north or east of the project area were identified during the viewshed analysis. Figure 12 shows the visual rendering baseline photo locations. Photos 3.5-11 through 3.5-20 show the baseline photos and renderings of the likely appearance of the PV panels from the locations along CR 217 and CR 62.

Photo 3.5-10. Typical view of the back of the solar panels.

Photo 3.5-11 shows the appearance of the project site from a vantage point near the northwest corner of the site, along CR 217 (Photo location 1 on Figure 12). The view is of a non-irrigated corn field which is ready to harvest. The corn plants in the foreground are brown and appear dried out, but there are green trees in the background, lending a softer and lusher appearance to the scene. Photo 3.5-12 is a rendering of what the Project would look like if constructed. The panels are geometric and regular, giving the view an industrial appearance. The trees in the background, however, serve to soften and enrich the view. This rendering represents what the project site would potentially appear as immediately following construction, as there are no plants growing under the panels.


AECOM
Photo Location and View Direction
Site Boundary
Solar Array
September 24, 2015
Figure 12
Photo Simulation Location Map
0 300 600 1,200 Feet
1
2
3
4

Although the site would be maintained to prevent herbaceous growth of more than 2 ft in height, presumably plant growth would occur under the panels. After the growth of these plants, the greenery under the panels would blend with the trees in the background, giving the view a somewhat more natural aspect. The geometry of the panels would remain; therefore, the site would always retain its new industrial aspect, even with the softening effect of the vegetation. The chain link fence with barbed wire adds to the industrial aspect, but from this angle it is not visually intrusive due to the similarity of the height of the fence and the PV panels themselves.

Photo 3.5-11: View of the Project Site from the northwest corner along CR 217 (Photo Location 1).

Photo 3.5-12: A rendering of the Project's post-construction appearance from the vantage point of the previous photo (3.5-11).

Photo 3.5-13 shows the project site from along CR 217 looking southeast towards CR 62 (Photo Location 2 on Figure 12). The scene shows a cotton field, with trees and an abandoned building in the distance. There are additional trees and slightly rolling hills in the far distance as well. The effect is driving down a country road, with peaceful and calming scenery. This view is likely to change over time though, as the cotton would be harvested and the greenery would be replaced by brown disturbed earth until vegetation could re-grow. Photo 3.5-14 shows a rendering of the PV facility's appearance post construction. The view is industrial in nature, as from the previous vantage point farther north on CR 217. From this angle however, it is more severe as the chain link fence and barbed wire are more visually obvious. Grasses and forbs would eventually colonize the area between the panels and the fence. This greenery would soften the view and would tie the roadside bushes to the trees in the distance, blending the panels with the surrounding visual attributes. As in the previous rendering however, the panels would retain their rigidity and continue to appear industrial in nature over the operating time frame. Both renderings are from viewpoints that are not heavily travelled. CR 217 is a gravel and dirt road and due to its course, it is not likely to be upgraded in the near future. Therefore, although the visual aspect of the project site would change from an agricultural scene to a more industrial view, it would not be seen by many travelers along CR 217 and therefore the visual impacts would be minor.

Photo 3.5-13: A view of the Project Site from CR 217, looking southeast towards CR 62 (Photo Location 2).

Photo 3.5-14: A rendering of the Project from the location of the previous photo (3.5-13)

Photo 3.5-15 was taken from the southwest corner of the project site, facing east on CR 62 (Photo Location 3 on Figure 12). This photo also shows a cotton field (on the left, the proposed project site). CR 62 is at the center of the view, and the single residence in the project vicinity is visible on the right side of the photo in the distance. The scene is rural and pastoral, as in the previous photos. Similar feelings of peace and quiet would be elicited from driving down CR 62 with agricultural fields on both sides. Photo 3.5-16 is a rendering of the proposed PV facility from the same location. Due to their geometrical design, the panels and the fence impart an industrial, man-made appearance which is juxtaposed with the rural and more natural setting on the other side of the road. The panels are lower in comparison with the road from this viewpoint than they are from CR 217. This gives them a smaller relief as viewed from this more traveled road. As the panels are somewhat recessed from this vantage point, trees and greenery would likely still be visible in the distance while driving past the Project. Along CR 62, the Project would extend for approximately one mile. Driving past the solar facility would not take long, and the rustic country view would be restored once past it.

Photo 3.5-15: A view of the Project Site (on the left) from the southwest corner, facing east on CR 62 (Photo Location 3).

Photo 3.5-16: A rendering of the Project from the location of the previous photo (3.5-15).

Photo 3.5-17 was taken from the residence on CR 62, to the south of the Project Area (Photo Location 4 on Figure 12). It shows the cotton field currently occupying the site in the growing stage. The view is pleasant, although the regularity of the cotton rows imparts an engineered aspect to the scene. There are many trees visible at the end of the rows; however, adding an organic quality to the view. Photos 3.5-18 through 3.5-20 show renderings of the Project from the same location, but at three different times of day and during high wind events. The panels present a more mechanized view of the field, but the trees are still visible above them in the distance. They are the least obtrusive in the rendering of what the project site would look like near the noon hour or during high wind events (Photo 3.5-19), with the panels parallel to the ground surface. As with the previous renderings, when plants begin to grow in under the panels and between the fence and the panels, the view would become less industrial. The trees in the distance and the bushes along the side of the road would blend with the herbs and grass growing under and amongst the panels. Overall, the view from the residence would be significantly altered, but as it is the only residence adjacent to the site, this impact would be considered minor. Additionally, drivers passing the project site in either direction would soon be re-immersed in a rustic viewshed.

Photo 3.5-17: The view of the Project Site from the residence on CR 62, just south of the site.

Photo 3.5-18: A rendering of the Project from the location of the previous photo (3.5-17) with the panels as they would appear in the morning hours, facing east.

Photo 3.5-19: A rendering of the Project with the panels in the position they would be at noon and during high wind events, horizontal.

Photo 3.5-20: A rendering of the Project with the panels as they would appear in the evening hours, facing west.

Site-wide, after construction of the Project, the softly undulating intermittently green and brown agricultural landscape would be replaced by industrial highly geometric patterns. The viewshed would change from a peaceful natural setting to a manufactured and structured appearance. Observers from the various viewpoints would most likely not experience the same aesthetic qualities that they currently do. These impacts would be most severe along CR 62 and from the single residence immediately to the south of the project site. The gently rolling landscape currently present would be replaced by the angular and geometrically arranged PV panels. Although grading plans intend to keep the general topography of the project site, the panels themselves would make the site look flatter. The surface of the panels themselves would also alter the view, as the dark, almost black surfaces would provide some reflection of the sky, and would not conform to the surrounding agricultural views which have softer tones and angles.

Overall, visual impacts during the operation phase of the Project would be moderate in the immediate vicinity, but minimal on a larger scale, due to a combination of changes to the visual attributes of the area, the visibility from up to one mile away and the existing general local character. These impacts would be minimized, however, due to the sparsely populated immediate area, the trees along CR 217 and CR 62 and gently undulating topography.

Figure 3 shows the site layout including the solar panels, detention basins, an O&M building, and the substation. The substation and associated new transmission line would be located in the northeast corner of the project site. There are no public roads in this area; therefore, visual impacts are not anticipated for the general public. Farmers harvesting or planting fields in the area may see these features temporarily while driving on the adjacent farmlands. This corner of the Project has trees associated with the ephemeral stream running along the north-south property boundary. There are also trees on the northern side of the corner. These trees would screen the substation from most angles, other than from within the project boundary and immediately under the existing transmission line. Therefore, given that very few people would be expected to experience the view of these structures, and even then infrequently, adverse visual impacts associated with the substation and new transmission line would not be anticipated.

On-site detention basins would be constructed throughout the western side of the project site to temporarily store stormwater and slowly release it. Although site layout designs have not been finalized, Figure 3 presents the proposed location of several small on-site detention basins totaling approximately 13.3 acres; the visual analysis in this Final EA evaluates the use of these five (5) detention basins. Three of the five detention basins and the O&M building may be visible from CR 217. These features are proposed to be located along the western property boundary, just south of the center of the site (Figure 3). From CR 62, there is a partial tree screen associated with one of the ephemeral streams between this area and any potential observer. The O&M building would be a single-story structure and the basins would be recessed, therefore the existing trees would at least partially shield these structures from the nearby residence and cars travelling on CR 62. From CR 217, the detention basins would be visible by observers driving past. As they would be recessed however, and proposed to be allowed to revegetate along the edges post-construction, they would not create an unwanted visual disturbance. Rather, they would appear as basins surrounded by bushes and reeds in a clearing, with the panels in the distance. The two interior detention basins would not be visible from the perimeter of the site due to the panels themselves. The O&M building may not be visible from CR 217 as it is located deeper into the solar facility. It is behind many rows of panels from the road. From some angles it may be visible due to the access gate and the access road leading to it. However, motorists would not see it for long when passing by, and it is proposed to be a relatively small structure. Therefore, the detention basins and the O&M building would not result in any direct, adverse impacts to visual resources along CR 217.

3.6 NOISE

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

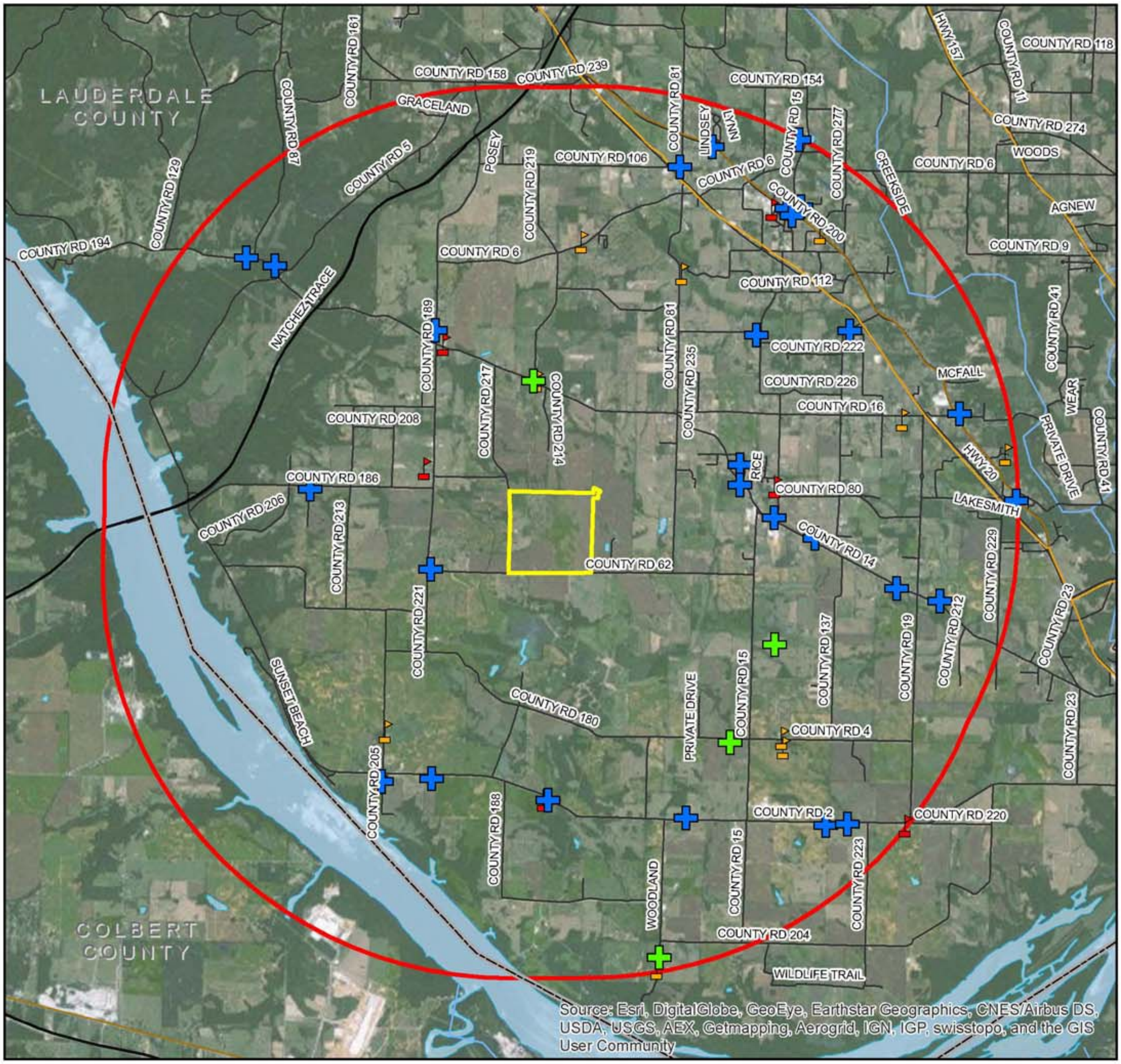
3.6.1 Affected Environment – Noise

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

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

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

Ambient noise at the project site consists mainly of agricultural, transportation, rural, and natural sounds (e.g. farming equipment, moderate traffic, moderate voice, wind, wildlife, and similar sounds). Generally, noise levels in these types of areas range from 45 to 55 dBA. There are no sensitive receptors in the form of schools, churches, or hospitals within 0.5 mile of the project site (Figure 13). The area surrounding the project site is primarily rural residential, agricultural, or undeveloped land with few residences close to the site.



Legend

- Church
- Church (historical)
- Schools
- Schools (historical)
- 5-mile Site Buffer
- Site Boundary

0 1 2 4 Miles

N W E S

Source: ArcGIS Aerial Map

Figure 13
Sensitive Receptors Map

3.6.2 Environmental Consequences – Noise

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

3.6.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility and transmission line would not be constructed and no project related impacts on the ambient sound environment would occur. Existing land use would be expected to remain a mix of farmland and unused land; therefore, the ambient sound environment would be expected to remain as it is at present. Indirect impacts to noise levels in the vicinity of the project site are possible if the area becomes developed or abandoned. If the property would be developed into a residential or industrial area in the future, noise levels would increase accordingly; if it were abandoned, then noise levels would decrease.

3.6.2.2 Proposed Action

Direct and indirect noise impacts associated with implementation of the Proposed Action would primarily occur during construction of the Proposed Action. Construction equipment produces a range of sounds while operational. Construction equipment that is proposed to be used for approximately one year on the project site is presented in Table 3.6-1. Noise levels associated with these types of equipment are also listed.

Table 3.6-1. Proposed Construction Equipment for the River Bend Solar Project

Equipment/Vehicle Type	HP	Hours/ Day/ Vehicle	Miles/ Day/ Vehicle Round Trip	Daily Count in Peak Month	Daily Count in Average Month	Maximum Noise at 50 ft (dBA)
MOBILIZATION						
Off-Site Worker Commuter Bus, Small	220	1	50	1	1	84
Off-Site Worker Commute Car	140	1	50	48	48	55
Off-Site Water Delivery Truck	435	1	50	5	5	84
Off-Site Equipment/Material Delivery Truck	235	1	50	2	2	84
Generator	30	6	0	1	1	82
On-Site Pick Up Truck	235	8	20	3	3	55
On-Site Flatbed Delivery Truck	28	6	20	2	2	84
5000 gal Water Truck	240	8	10	5	5	84
On-Site Service Truck	235	4	20	1	1	55
On-Site Lube/Fuel Trucks	235	6	20	1	1	55
CIVIL IMPROVEMENTS - GRADING/ROADS/EARTHWORK						
Off-Site Worker Commute Car	140	1	50	132	112.8	55

Table 3.6-1. Proposed Construction Equipment for the River Bend Solar Project

Equipment/Vehicle Type	HP	Hours/ Day/ Vehicle	Miles/ Day/ Vehicle Round Trip	Daily Count in Peak Month	Daily Count in Average Month	Maximum Noise at 50 ft (dBA)
Off-Site Water Delivery Truck	435	1	50	8	6.8	84
Off-Site Equipment/Material Delivery Truck	235	1	50	2	0.8	84
Dozer Cat D6R	185	8	10	4	4	85
Generator	30	8	0	4	4	82
Scraper Cat 623	365	8	10	4	4	85
Deere 210LE Skip Loader	78	8	10	4	4	84
Cat 140H Grader	185	8	10	6	6	85
5000 gal Water Truck	240	8	20	8	8	84
Roller Vibrator/compactor/other	350	6	5	2	0.8	80
Cat BG600D Paver	173	6	5	1	0.4	85
On-Site Heavy Duty Pick Up Truck	210	6	20	4	4	55
On-Site Flatbed Delivery Truck	280	6	20	3	1.2	84
On-Site Lube/Fuel Trucks	235	6	20	6	6	55
On-Site Service Truck	280	6	20	4	4	55
On-Site Dump Truck	280	6	20	5	5	84
PLANT CONSTRUCTION						
Off-Site Worker Commuter Bus, Small	220	1	40	2	2	84
Off-Site Worker Commute Car	140	1	40	94	61	55
Off-Site Concrete Truck	300	1	40	4	3.5	85
Off-Site Equipment/Material Delivery Truck	235	1	40	6	6	84
Off-Site Equipment/Material Delivery Truck	235	2	100	4	4	84
Generator	30	8	0	2	2	82
Air Compressor	25	8	0	2	2	80
Dozer Cat D6R	185	4	10	1	1	85
Deere 210LE Skip Loader	78	8	10	3	3	84
Telehandler	99	8	10	4	4	84
Track Trencher	115	8	10	2	2	84
Cat 583T Pipelayer	310	6	10	2	2	84
On-Site Concrete Truck	350	8	30	0	0	85
On-Site Pick Up Truck	210	6	25	4	4	55
On-Site Heavy Duty Pick Up Truck	235	6	20	2	2	55
On-Site Flatbed Delivery Truck	280	6	25	4	4	84
On-Site Service Truck	210	6	25	3	2	55
On-Site Dump Truck	280	6	20	1	1	84
On-Site Lube/Fuel Trucks	210	6	25	2	2	55
Pauselli 1200 Solar Pile Driver	64	10	1.5	4	2	75

Table 3.6-1. Proposed Construction Equipment for the River Bend Solar Project

Equipment/Vehicle Type	HP	Hours/ Day/ Vehicle	Miles/ Day/ Vehicle Round Trip	Daily Count in Peak Month	Daily Count in Average Month	Maximum Noise at 50 ft (dBA)
SUBSTATION-BLDG-CONSTRUCTION						
Off-Site Worker Commute Car	140	1	40	38	38	55
Off-Site Equipment/Material Delivery Truck	235	1	40	0.5	0.5	84
On-Site Heavy Duty Pick Up Truck	235	6	20	1	1	55
On-Site Flatbed Delivery Truck	280	6	20	2	2	84
Generator	30	6	0	1	1	82
Air Compressor	25	6	0	1	1	80
Skip Loader	78	6	10	2	2	84
Crane - Boom Truck	250	6	10	2	2	85
TESTING & COMMISSIONING						
Off-Site Worker Commute Car	140	1	40	30	30	55
Off-Site Equipment/Material Delivery Truck	235	1	40	0.5	0.5	84
On-Site Heavy Duty Pick Up Truck	235	6	20	2	2	55
On-Site Service Truck	210	6	25	1	1	55
Cat BG600D Paver	173	6	5	1	1	85
Roller Vibrator/compactor/other	350	6	5	1	1	80

Source: U.S. Department of Transportation. 2006. FHWA Roadway Construction Noise Model User's Guide, January 2006. FHWA-HEP-05-054, DOT-VNTSC-FHWA-05-01

Construction noise would cause temporary and short-term adverse impacts to the ambient sound environment around the project site. Homeowners adjacent to the property boundary could experience elevated noise levels. Most of the proposed equipment would not be on-site and operating for the entire construction period, but would be phased in and out according to the progress of the project. The equipment most likely to make the most noise would be the pile driving activities during the construction of the array and building foundations. Standard construction pile drivers are estimated to produce between 90 to 95 dBA (calculated at a distance of 50 ft) at close range (USDOT 2011). The specialty pile drivers proposed to be used for solar panel installation produce less noise (Table 3.6-1), and the piles supporting solar panels would be driven into soil with little to no rock drilling anticipated. Construction workers would wear appropriate hearing protection in accordance with Occupational Safety and Health Act (OSHA) regulations.

For point of reference, approximate noise levels (measured in dBA) of common activities/events are provided below.

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

There is only one residence immediately adjacent to the project site and existing ambient noise periodically would include tractors and other farm equipment. As construction would occur during the day, presumably when farm activities occur, there would not be a significant difference in noise levels other than during pile driving.

Construction of the new transmission components in the adjacent ROW would have similar impacts to noise. Pile driving equipment could be used to erect the transmission poles. This area, however, is distant from any residence or other potential noise receptor. Therefore, impacts to noise due to construction in the ROW would be minimal.

Following completion of construction activities, the ambient sound environment would be expected to return to existing levels or below. The moving parts would be electric-powered and produce little noise. Consequently, the Proposed Action would have minimal effects on noise levels as a result of normal continuous operation. Periodic mowing would generate noise comparable to that of the operation of farm equipment.

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

3.7 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

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

3.7.1 Affected Environment – Air Quality and Climate Change

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

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

3.7.1.1 Regional Air Quality

Lauderdale County and the entire state of Alabama were declared in attainment for NAAQS pollutants by the USEPA as of March 2014 (ADEM 2014b). Lauderdale County was in non-attainment for SO_2 in 1992, but has been in attainment since 1993 (USEPA 2015c). The average emissions in the county for 2011 are presented in Table 3.7-1. Not all Tier 1 sectors are measured in Lauderdale County. Those measured by the USEPA in 2011 include fuel combustion, industrial, fuel combustion other, petroleum and related industries, other industrial processes, waste disposal and recycling, highway vehicles, off highway, solvent utilization and miscellaneous (USEPA 2011).

Table 3.7-1. Average emissions of NAAQS pollutants in Lauderdale County for 2011.

Pollutant	Emissions (tons per year)
Carbon Monoxide	21737.2
Nitrogen Oxides	3179.6
PM_{10} Primary (Filt + Cond)	8778.8
$PM_{2.5}$ Primary (Filt + Cond)	2082.8
Sulfur Dioxide	499.9
Volatile Organic Compounds	4515.3

Source: USEPA 2011

3.7.1.2 Regional Climate

Weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. The climate in the region of the proposed project is characterized by warm, humid summers with average temperatures around 80 degrees Fahrenheit (F) and cool winters with average temperatures around 50 degrees F. Precipitation is highest from November through May (US Climate-Data 2015). Precipitation averages 53 inches per year (US Climate Data

2015). Huntsville, Alabama, approximately 75 miles east of the project site, averages 100 sunny, 101 partly sunny, and 201 total days with some sun per year (Current Results 2015). Western Alabama, including the area around the City of Florence, is vulnerable to tornados. Approximately 44 tornados occur, on average, throughout the state each year (National Oceanic and Atmospheric Administration [NOAA] 2015); Florence area historical tornado activity is slightly higher than both the Alabama and overall US average (City-Data 2015b).

3.7.1.3 Greenhouse Gas Emissions

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

The most common GHG emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The primary GHG emitted by human activities in the US is CO_2, representing approximately 85 percent of total GHG emissions. The largest source of CO_2 and of overall GHG emissions is fossil fuel combustion. CH_4 emissions, which have declined from 1990 levels, result primarily from enteric fermentation (digestion) associated with domestic livestock, decomposition of wastes in landfills, and natural gas systems. Agricultural soil management and mobile source fuel combustion are the major sources of N_2O emissions in the US (USEPA 2012). Lauderdale County GHG emissions from 2011 are shown in Table 3.7-2. GHG emissions from the TVA power system are described in TVA 2015a.

Table 3.7-2. Average emissions of GHGs in Lauderdale County for 2011

Pollutant	Emissions (tons per year)
Carbon Dioxide	698,793.2
Methane	150.8238
Nitrous Oxide	30.82865

Source: USEPA 2011

3.7.2 Environmental Consequences – Air Quality and Climate Change

This section describes the potential impacts to climate and air quality should the Proposed Action or alternatives be implemented.

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility and transmission line would not be constructed. Therefore, no project related impacts on climate or air quality would result. Existing land use would be expected to remain a mix of farmland and undeveloped land, and the existing habitat would be expected to remain as it is at present, with little effect on climate and air quality.

3.7.2.2 Proposed Action

The majority of potential air quality impacts associated with the Proposed Action would occur during construction. Construction activities would create emissions from the construction equipment and vehicles, contracted employee's personal vehicles, and fugitive dust mobilization from clearing, grading and other activities. Ninety-five percent (by weight) of fugitive emissions from vehicular traffic over paved and unpaved roads would be comprised mainly of particles that would be deposited near the roadways along the routes the construction and contractors' vehicles would travel to reach the site. If necessary, emissions from construction areas, paved, and unpaved roads would be mitigated using BMPs including wet suppression. From roadways and unpaved areas, wet suppression can reduce fugitive dust emissions by as much as 95 percent. Therefore, direct impacts to air quality associated with construction activities would be expected to be minor.

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

The Project would require the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. The felling of a few trees currently on the project site during construction would result in a very small loss of potential carbon sequestration potential. The trees currently remove CO_2 from the air and sequester it as biomass. The loss of this carbon sink would be offset by the increase in soil carbon sequestration resulting from the conversion of the site from the existing row crops to stable grassland. The likely small increase in carbon sequestration would have a negligible effect on regional atmospheric GHG concentrations.

Air quality impacts from the construction of the Proposed Action would be temporary and dependent on both man-made factors (e.g., intensity of activity, control measures) and natural factors (e.g., wind speed, wind direction, soil moisture). However, even under unusually adverse conditions, these emissions would have, at most, a minor, transient impact on off-site air quality and be well below the applicable ambient air quality standard. Overall, the direct air quality and GHG emissions impact of the construction of the Proposed Action would not be significant.

The operation of the proposed solar facility is not anticipated to have any negative impacts to air quality or GHG emissions, as only minor maintenance would occur. The operation of mowers and weed eaters – or the grazing of sheep – would not constitute a major source of air pollutants.

Conversely, overall pollutant emissions from the TVA power system would decrease during operations as the emissions-free power generated by the solar facility would offset power that would otherwise be generated, at least in part, by the combustion of fossil fuels. The solar facility would be part of the cleaner, lower-emitting generating portfolio described in the 2015 IRP (TVA 2015a) and would contribute to the approximate 44 percent reduction in CO_2 emissions projected between 2014 and 2033. While the reductions in air pollutant and CO_2 emissions attributable to the solar facility would be relatively minor, they would be a component of TVA's projected significant overall reductions and the associated beneficial impacts to air quality and reduced impacts from climate change.

Agricultural practices which currently raise dust and combustion byproducts would be discontinued at the project site. Therefore, operations could ultimately result in a minor beneficial impact to local air quality.

3.8 CULTURAL RESOURCES

This section describes an overview of existing cultural resources within the Project Area and the potential impacts on these cultural resources that would be associated with the Proposed Action and No Action alternatives. Components of cultural resources that are analyzed include prehistoric and historic archaeological and architectural resources.

3.8.1 Affected Environment – Cultural Resources

Cultural resources include archaeological sites, standing structures, objects, districts, traditional cultural properties, and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities and/or social groups.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470) is specifically designed to address the effects of federal and/or federally-funded projects on both built resources (such as buildings, bridges, and levees) and underground (archaeological) resources. The NHPA provided for a national program to support both public and private efforts to identify, evaluate, and protect the nation's important historic and archaeological resources. These resources, collectively called "cultural resources," are evaluated for their eligibility for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service. The NRHP is a list of buildings, districts, sites, structures, and objects significant to local, state, or national history and prehistory. Cultural resources may qualify for inclusion in the NRHP under one of four primary criteria:

- *Criterion A:* association with events that have made a significant contribution to the broad patterns of American history. This criterion includes literature, ethnic heritage, health/medicine, transportation, and many others.

- *Criterion B:* association with the life of significant persons. Examples of National Register properties nominated under *Criterion B* include George Washington's Mt. Vernon estate and, closer to the project site, the Helen Keller Birthplace in Tuscumbia.
- *Criterion C*: embodiment of the distinctive characteristics of a type, period, or method of construction. This inclusion also includes the works of a master or buildings that possess high artistic value.
- *Criterion D*: cultural resources that have yielded or may be likely to yield information important in history or prehistory. This category is typically the most relevant criterion for archaeological resources.

Cultural resources that are listed, or considered eligible for listing, on the NRHP are called "historic properties." Federal agencies are required by the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. "Undertaking" means any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency, or is licensed or assisted by a federal agency. Considering an undertaking's possible effects on historic properties is accomplished through a four-step review process outlined in Section 106 of the NHPA (36 CFR Part 800). These steps are:

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

Throughout the process the lead federal agency must consult with the appropriate State Historical Preservation Officer (SHPO) and federally recognized American Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. TVA initiated tribal consultation in a letter dated 2 June 15 (Appendix G).

As part of the evaluation process, an archaeological survey (November 2014) and a separate architectural survey (March 2015) were conducted to determine the presence of prehistoric and historic cultural resources that are listed on or potentially eligible for the NRHP. The archaeological survey was conducted in the early Project design phase (November 2014) when the boundary of the Project was 690 acres. Subsequent design work has reduced the total project area to 645 acres. Two APEs were defined for the project; the direct effects APE consists of an approximately 690-acre area. The direct effects APE is defined as the area that would be directly impacted by potential site construction, clearing, and operations. The archaeological survey was conducted within the boundaries of the direct effects APE. The indirect effects (or historic structures) APE includes the area within one mile of the 690-acre site to consider the potential for indirect effects to historic viewsheds for any surrounding historic properties

3.8.1.1 Previous Surveys

Background research revealed one known cultural resource within the survey area. A 1996 survey conducted by the University of Alabama, University of Alabama Museums, Office of Archaeological Services located prehistoric site 1LU608 within the boundaries of the Project Area. Site 1LU608 consists of a sparse scatter of prehistoric artifacts located in a heavily eroded cultivated field. The survey authors considered the site to be disturbed and ineligible for listing on the NRHP and recommended no further investigation (Meyer et al. 1996). No existing archaeological or historic sites listed on or eligible for inclusion in the NRHP were identified within the Site boundary or within 0.5 miles of the boundary during the records search.

3.8.1.2 Cultural Setting

The project site is located in the heart of a diverse historical area. Prehistoric sites from Paleo-Indian (circa [ca.] 15,000 years ago) to Historical Contact (1540 A.D.) are recorded throughout the region.

The region surrounding the project site in Lauderdale County is bordered on the west and south by the Tennessee River (McDonald 2003). When the Spanish, English, and French explorers came into the area of northwest Alabama prior to the end of the 17th century, they reported the lands were occupied by the Euchees, also known as the Tohogalega or Hogaloge. These people were later pushed out by the invading Shawnee. The Euchees spoke a dialect that was different from the other southeastern tribes in the region and followed a custom of using boards to flatten their children’s heads, a tradition common to several tribes in the northwestern United States. The Shawnee inhabited the area until the Creek-Cherokee War from 1715 to 1727 when the Shawnee were expelled and replaced largely by the Cherokee and Chickasaw. But these “boundaries” were never very firmly set; explorers and traders continued to report wandering bands of Creek and Shawnee in the area (McDonald 2003).

By 1816, the majority of the Cherokee and Chickasaw were removed from the area either through treaty or violence. The exception was one Chickasaw/Scotsman named Chief George Colbert, who from 1816 to 1819 retained a sliver of western Lauderdale County (called the “Colbert Reserve”). The project site is located within a portion of the Colbert Reserve. The Chief and his family operated a ferry and inn on the Reserve, setting the path for a road that would become the Natchez Trace Parkway (McDonald 2003).

The region around the site had trading posts established beginning around 1780 when speculators started arriving. The arrival of these land speculators led to violent confrontations between the Chickasaw at Coldwater (Tuscumbia, Alabama), their allied French traders and American settlers. An American blockhouse fort was illegally (by violation of signed treaty) constructed in 1791 but quickly abandoned the same year after pressure from local tribes. By 1804, however, illegal squatters were forcing the federal government to protect the treaty rights, and in 1809 there were a reported 201 white settlers in the region evicted by the US Army. These squatters kept returning and the army conducted several more large raids over the next few years to destroy their cabins and evict the illegal settlers to no avail. In 1818, the land, except for the Colbert Reserve, was completely relinquished by the Cherokee and Chickasaw and squatters were allowed to stay. On 14 December 1819, Alabama was admitted to the union and the area of modern day Lauderdale County allowed more legal settling alongside the previous squatters. Chief Colbert and the last of his people were removed to Oklahoma around 1836 or 1837 (McDonald 2003).

The parcels that comprise the site were purchased as individual parcels by the state and private investors at various times. According to plat maps from the local genealogical section of the Florence Public Library, Mr. Aaron Hill purchased the southern half of the northwest quarter of section 31 on 8 June 1833, and Mr. Peter R. Booker purchased the northern half of the same quarter. Mr. Irvin R. Sherrod purchased the portion of section 29 that is included in the site and the State of Alabama owned the other sections up to 22 July 1926. Not much is known about Mr. Hill, except that he came from a large family that settled in the area. The same can be said of Mr. Sherrod. Mr. Booker was a wealthy lawyer from Maury County, Tennessee who purchased large amounts of land in Tennessee, Mississippi, the Carolinas, and Alabama for real estate speculation. The 1840 US Census had his home listed as a large house with 11 family members as well as nearly 80 slaves. He died in May 1839 as discussed in a court file from Tennessee discussing the distribution of his estates. However, he probably sold off his lands in Alabama during one of his numerous land sales from 1835 to 1838 since there is no mention of any of these in the will (McDonald 2003).

The region remained fairly quiet until the American Civil War. A railroad ran through Tuscumbia, on the south side of the Tennessee across from Florence, and both towns changed hands several times during the course of the war. Lauderdale County was an area with both strong union and confederate loyalties and the guerilla actions of murder and pillaging from both groups led to bitterness long after the war was over, resulting in vigilante shootings and hangings for years afterwards (Freeman 2004).

The project area is surrounded by Civil War history. The Canaan Methodist Church, built in 1844 and located 1 mile to the west of the site, was used as a hospital and billet by both Federal and Confederate soldiers during the war. According to a local report, several Confederate soldiers, most likely guerrillas, held up there to snipe at union cavalrymen who then stormed the church and removed the threat. The walls and several pews of the church bore the scars of bullet holes until 1968. At that time the pews were moved to the Pope Tavern museum in Florence and the church was remodeled; a few bullet holes are reportedly still present behind the altar (Darby 1979).

In 1864, elements of General Hood's Army of Tennessee moved through the area and engaged in numerous skirmishes with local Union garrisons as they advanced into Tennessee. In 1865, Union General Wilson used Gravelly Springs, located approximately 6 miles northwest of the site, as the largest cavalry camp in the war to prepare for his great raid eastward in that same year. The roads around the project area were traversed by large armies and small bands of guerillas and loyalist groups (The Journal of Muscle Shoals History 2000).

After the war, the fields were farmed by share croppers. Approximately a dozen of their houses occupied the western portion of the site and others were present in surrounding areas. Maps from 1942 and 1954 show these houses, and some locals recall people living in some of the houses into the late 20th century. Some of these structures may still be present. It is unknown exactly how many structures were within this community. A cemetery was located just to the west of this small community in Section 36. This cemetery is shown on maps, but there is no evidence of this cemetery at the surface today and no evidence that it is currently visited. The area is currently an agricultural field.

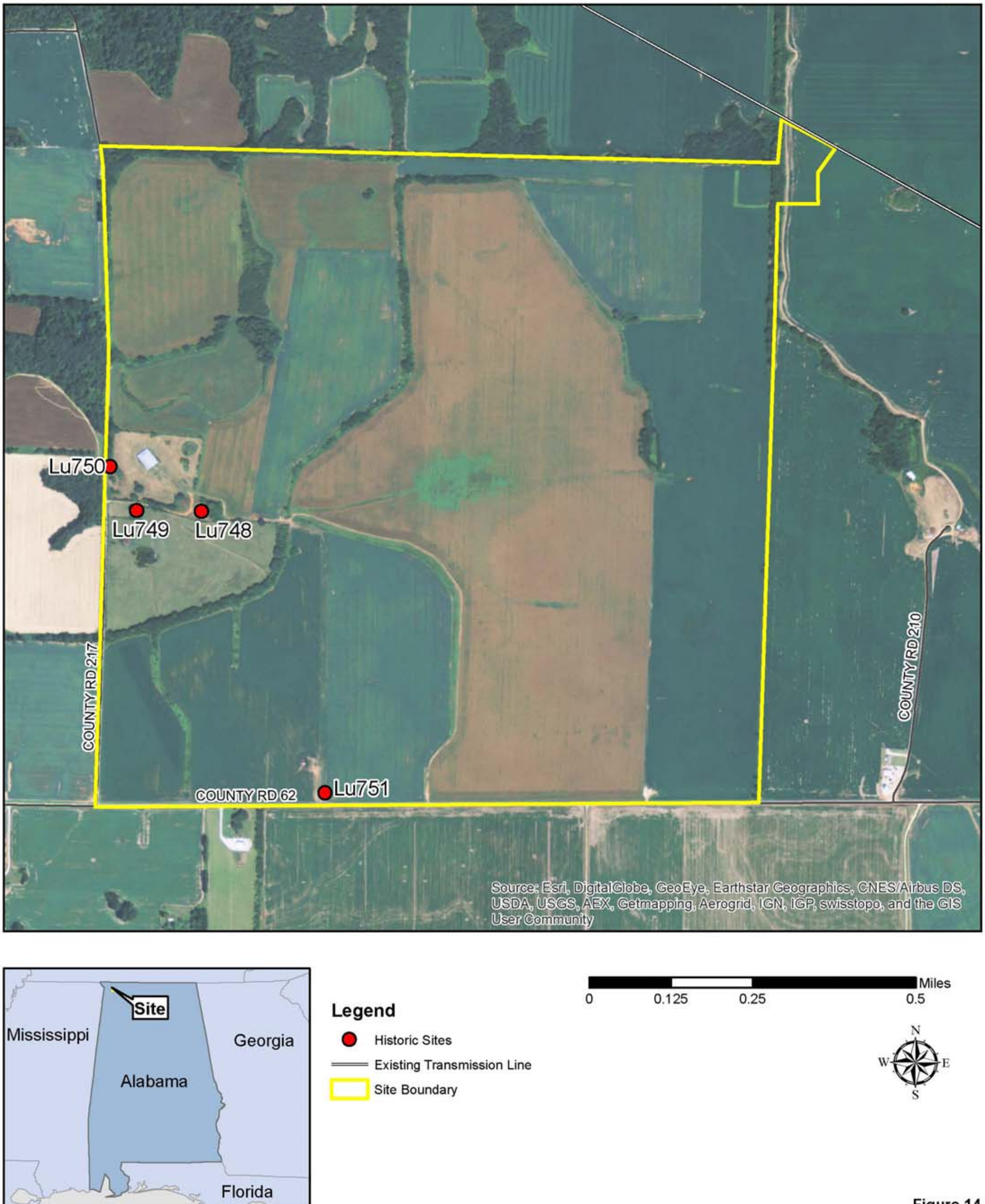
3.8.1.3 Survey Results

AECOM surveyed approximately 690 acres from 12 November to 24 November 2014. The archaeological survey included field inspections of the Project Area via visual examination of exposed ground surfaces and systematic shovel testing at 30 meter (100 ft) intervals. Tables 3.8-1 and 3.8-2 present summaries of the sites and isolated occurrences, respectively, which were recorded and/or re-examined during survey and NRHP recommendations.

The archaeological remains associated with four historical dwelling sites (three still standing) (sites Lu748, Lu749, Lu750, and Lu751 on Figure 14), three historic isolated occurrences (IO-1, 3, and 4), and one prehistoric IO (IO-2) were evaluated. Three of the four historic dwellings are largely intact. Two of the standing structures include 19th century fireplaces in the core rooms and 20th century add-on wings. The other historic dwelling site consists of historic scatters of 19th to early 20th artifacts and a two story barn with a metal roof. The historic IOs (IO-1, 3, and 4) included pottery, ceramic, and wire fragments. The prehistoric IO (IO-2) is a lithic fragment located in the vicinity of the previously recorded Site 1LU608 (Freeman 2015).

In March 2015, Tennessee Valley Archaeological Research (TVAR) conducted an architectural survey to assess the architectural integrity and NRHP eligibility of the structures on and within a one mile indirect effects APE around the project site. TVAR evaluated the three standing historical dwellings within the project site boundaries and two structures within the indirect effects APE.

Site Lu748 is a center hall-plan house constructed in ca. 1900. The house has an associated cistern. The house “fails to exhibit unique features of its architectural style or workmanship.” Additionally, the structure has been altered with modern construction and materials and is currently in disrepair, all of which has compromised its integrity. “Based upon the lack of architectural merit, as well as the inability to associate the house and/or its original owners(s) with an important historical event or series of events” TVAR recommended the site is not eligible for the NRHP (Karpynec and Weaver 2015). AECOM also recommends Lu748 is not eligible for the NRHP due to the lack of intact archaeological deposits and a lack of research potential.



Source: ArcGIS Aerial Map

Figure 14
Historic Site Locations Aerial Map

Site Lu749 is a one-story center hall-plan house constructed in ca. 1900. Associated structures include a brick cistern, a barn that is roughly contemporaneous with the dwelling, and two modern sheds. The house "fails to exhibit unique features of its architectural style or workmanship" and has been altered with modern construction and materials. The structure is in disrepair which has compromised its integrity. "Based upon the lack of architectural merit, as well as the inability to associate the house and/or its original owner(s) with an important historical event or series of events" TVAR recommended the site is not eligible for the NRHP (Karpynec and Weaver 2015). AECOM also recommends Lu749 is not eligible for the NRHP due to the lack of intact archaeological deposits and a lack of research potential.

Site Lu750 is a hall-and-parlor plan house constructed in ca. 1900. The house "fails to exhibit unique features of its architectural style or workmanship" and has been altered with modern construction and materials. The building is "ruinous" and in serious disrepair. The disrepair and alterations have compromised its integrity. "Based upon the lack of architectural merit, as well as the inability to associate the house and/or its original owner(s) with an important historical event or series of events" TVAR recommended the site is not eligible for the NRHP (Karpynec and Weaver 2015). AECOM also recommends Lu750 is not eligible for the NRHP due to the lack of intact archaeological deposits and a lack of research potential.

AECOM's investigation included Site Lu751, the location of a former dwelling site shown on historic maps of the area. Nothing is known about the size or design of the structure that once occupied this site. A large two story metal-roofed barn still stands; it was associated with the structure on both of the historic maps. AECOM recommends that Lu751 is ineligible for listing on the NRHP due to the lack of intact archaeological deposits and a lack of research potential.

In addition to the historic structures located within the site boundary, TVAR evaluated two historic structures within the one mile historic structures APE. The first historic structure is located south of the site; this site (IS-3) consists of a Folk Victorian style house constructed in ca. 1910. The house "fails to exhibit unique features of its architectural style or workmanship" and has been altered with modern construction and materials and the removal of distinguishing architectural features. Additionally the structure is in disrepair. The combination of these events has compromised the integrity of the house. "Based upon the lack of architectural merit, as well as the inability to associate the house and/or its original owner(s) with an important historical event or series of events" TVAR recommended the site as not eligible for the NRHP (Karpynec and Weaver 2015).

The second historic structure was a previously documented architectural resource located within the historic structures APE, the "10 0 8-9/Canaan Methodist Church". The church was constructed in ca. 1844, and is a typical example of a one-and-a-half-story, gable-front church with an adjoining cemetery (Karpynec and Weaver 2015). During the Civil War the church was used as a temporary field hospital for the Confederacy following a skirmish that reportedly occurred on the grounds (AHC 1978). The church was reportedly severely damaged by a tornado in 2011. The Canaan Methodist Church has not been formally evaluated for inclusion on the NRHP. TVAR concluded that the church "fails to exhibit unique features of its architectural style or workmanship." The building has also been modified significantly with modern materials and methods. There is no evidence that the church had an integral role in local historical events; therefore, it is the opinion of TVAR that Canaan Methodist Church is not eligible for the NRHP (Karpynec and Weaver 2015).

AECOM and TVAR recommend the four historic sites and the four IOs located within the project boundary and the historic structure within the one mile historic structure APE as ineligible for listing on the NRHP due to the lack of intact archaeological deposits, lack of architectural merit, lack of ability to associate the structures with important historical events, and a lack of research potential. No further work is recommended.

Table 3.8-1. Summary of sites recorded and/or re-examined during survey and NRHP recommendations

Site Number	Cultural Affiliation-Location	NRHP Recommendation
1LU608	Archaic lithic scatter	Not Eligible
Lu748	Late 19th-Early 20th century; structure, outbuildings, historic scatter	Not Eligible
Lu749	Late 19th-Early 20th century; structure, outbuildings, historic scatter	Not Eligible
Lu750	Late 19th-Early 20th century; structure, outbuildings, historic scatter	Not Eligible
Lu751	Late 19th-Early 20th century former structure location, historic scatter	Not Eligible

Table 3.8-2. Summary of isolated occurrences (IOs) recorded during survey and NRHP recommendations

IO Number	Cultural Affiliation	NRHP Recommendation
IO-1	Historic, 20th century	Not Eligible
IO-2	Prehistoric	Not Eligible
IO-3	Historic,19th century	Not Eligible
IO-4	Historic, unknown age	Not Eligible

3.8.2 Environmental Consequences – Cultural Resources

No cultural resources listed on, or eligible for listing on, the NRHP ("historic properties") were identified within the archaeological and architectural APEs for the proposed undertaking. Therefore, the Proposed Action would not affect historic properties. TVA initiated consultation with the SHPO on 29 May 2015 with respect to the findings of both the archaeological and architectural surveys and its determination of no effects on historic properties. TVA received SHPO concurrence in a letter dated 18 June 2015 (Appendix G).

Although a search of the TVA SAR database identified cultural resources along the existing transmission line corridor in the vicinity of structures 92 and 93 (Figure 2), the work proposed to occur in this area would not have the potential to adversely impact these resources.

3.9 UTILITIES

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

3.9.1 Affected Environment – Utilities

The City of Florence is the county seat of Lauderdale County and the source for the majority of the public services provided to the project site and adjacent areas. Public services include sanitary water, sewer, utilities (including natural gas and electricity) services, and solid waste disposal services.

3.9.1.1 Electrical Service

Electrical service is provided in the project area by Florence Utilities. In addition, the TVA 161-kV Colbert Fossil Plant-Selmer transmission line passes adjacent to the northeast corner of the Project (Figure 3).

3.9.1.2 Natural Gas

Natural gas in the area is provided by Selmer Utility Division. No natural gas lines are located on the project site or in the immediate vicinity.

3.9.1.3 Water Supply

There is currently no water supply to the project site as no residences are located on-site. There is also no wastewater treatment system or connection to the City of Florence sewer.

3.9.1.4 Communication Resources

There are currently no occupied residences on the property; therefore, there are currently no communication resources on the project site.

3.9.2 Environmental Consequences – Utilities

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

3.9.2.1 No Action Alternative

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

3.9.2.2 Proposed Action

Under the Proposed Action, the 161-kV transmission line which passes to the northeast of the project site would be connected to the proposed new facility. A new substation would also be constructed. The overhead ground wires on an adjacent section of the TVA Colbert-Selmer line would be replaced with overhead ground wires containing fiber-optic cables. Station electrical service would be provided by Florence Utilities, via an existing distribution line along CR 62. Station service would be for construction and the O&M building/well/control systems only; it would not power the trackers. No impacts to customers utilizing this line would be anticipated as a result of the construction or tie-ins; therefore, no adverse impacts would be anticipated to electrical services with implementation of the Proposed Action. Implementation of the Proposed Action would result in additional renewable energy resources in the region which would constitute a beneficial impact to electrical services in the region.

As part of the Proposed Action, groundwater wells and a potential water treatment facility would be installed to provide water for construction and potable water for employees at the project site. The installation of these wells and the associated water use should not impact other users of groundwater in the area. Connection to the City of Florence water system is not anticipated. Sewer treatment would be accomplished through use of a pump-out septic holding tank and would be appropriately permitted and constructed so as not to impact any local systems or properties.

Natural gas service would not be required during the construction or operation of the Project.

Telecommunications would most likely be acquired through the City of Florence Utilities department. These lines would probably be underhung along the electrical connection to Florence Utilities. Additionally, to facilitate the operation of the proposed site and transmission line connection, TVA proposes to also undertake the following additional activities:

- Installation of OPGW on about 2 miles of the Colbert Fossil Plant-Selmer transmission line from the River Bend Solar interconnection east and south to structure 92 located about 0.25 miles south of CR 62; and
- Installation of telecommunications connections at the Selmer Tennessee substation and Colbert Fossil Plant and Wilson Hydro Plant 161-kV switchyards.

Neither of these additions to the transmission lines or the existing communication system would have an adverse impact to telecommunications in the local area.

Overall, no impacts to utilities would be anticipated as a result of implementation of the Proposed Action. No indirect impacts to utilities would occur under the Proposed Action.

3.10 WASTE MANAGEMENT

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

3.10.1 Affected Environment – Waste Management

"Hazardous materials" and "hazardous waste" are substances, which because of their quantity, concentration, or characteristics (physical, chemical, or infectious), may present a significant danger to public health and/or the environment if released. These substances are defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. 9601 et seq.) and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act ([RCRA]; 42 U.S.C. 6901 et seq.). Regulated hazardous wastes under RCRA include any solid, liquid, contained gaseous, or semisolid waste or combination of wastes that exhibits one of more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or is listed as a hazardous waste under Title 40, CFR, Part 261. Storage and use of hazardous materials and wastes are regulated by local, state, and federal guidance including the Emergency Planning and Community Right-to-Know Act (42 U.S.C. 116 *et seq.*) and RCRA.

Currently, land use on the site is agricultural or undeveloped. No known hazardous waste is generated on or stored at the site. Petroleum products are stored and used on the project site as part of the current agricultural operations. AECOM staff surveyed the project site in November 2014 and observed no waste-related environmental conditions. In May 2015, as part of the property purchase process, a Phase I Environmental Site Assessment was conducted to establish the presence, former use or spillage of hazardous substances or petroleum products on-site. This assessment revealed no recognized environmental conditions (RECs), controlled RECs or historical RECs in connection with the subject property.

The project site is located in unincorporated Lauderdale County. Solid waste in Lauderdale County is managed by the Lauderdale County Solid Waste Department through the Lauderdale County government offices. The Lauderdale County Landfill, located on Hwy 157 N north of Florence, processes household garbage, building type debris, trees and limbs, paper, tires, and some appliances. The county also provides residential garbage pickup for residents outside of the Florence city limits. The county does not pick up liquids, paints, or other hazardous type materials. Also, special precautions need to be taken for the disposal of medical wastes (Lauderdale County 2015).

The City of Florence has a residential curbside recycling program and will also pick up recyclable items from businesses. Additionally, the city recycling center is open 7 days a week for dropping off items. Recyclable items include cardboard, paper, aluminum, steel, #1 and #2 plastics, motor oil and cooking oil (City of Florence 2015a).

3.10.2 Environmental Consequences – Waste Management

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

3.10.2.1 No Action Alternative

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

3.10.2.2 Proposed Action

Construction of the Proposed Action would result in the generation of hazardous and nonhazardous solid and liquid waste in the form of construction debris, grading spoils, wastewater, packaging materials, and general construction waste. Under the Proposed Action it is anticipated that a total of approximately 150 cubic yards and 2,800 gallons of hazardous waste would be generated for the duration of the construction. An additional 2,880 cubic yards of non-hazardous solid, and 75,500 gallons of non-hazardous liquid waste would be generated during the construction process.

Materials suitable for soil compaction activities such as gravel and soils would be brought to the site as needed and off-loaded at the designated road or building location for immediate dispersion. Materials unsuitable for compaction, such as mowed debris, would be removed and loaded immediately for subsequent disposal at an acceptable off-site location. Contaminated grading and mowing materials are not anticipated; however, if any such materials are encountered during excavation, they would be disposed of at the nearest appropriate facility in accordance with applicable laws, ordinances, regulations, and standards. It is estimated that not more than five cubic yards of construction debris and material waste would be generated each week, which would be accumulated in a construction debris container and hauled off monthly. A list of acceptable waste facilities is listed in Table 3.10-1.

Table 3.10-1.
Waste Facilities near the River Bend Solar Project Site

Landfill	Address	Website	Description
Lauderdale County Landfill	5700 Hwy 157 N. Florence, AL 35630	http://lauderdalecountyonline.com/New_Website/Solid_Waste/index.html	Household waste, building type debris, trees and limbs, paper, tires, appliances (that have not had Freon in them)
City of Florence Landfill	29485 County Road 14 Florence, AL 35633	http://www.florenceal.org/Public_Works/Solid_Waste/index.html	Construction and Demolition debris Recycling Facility

Hazardous Materials Management

During construction, all hazardous materials would be stored on-site in storage tanks, vessels, or other appropriate containers specifically designed for the characteristics of the materials to be stored. The storage facilities would include secondary containment in case of tank or vessel failure. Construction- and decommissioning-related hazardous materials used for development of the Proposed Project would include: gasoline, diesel fuel, oil, lubricants, and small quantities of solvents and paints. Material Safety Data Sheets for all applicable materials present on-site would be made readily available to on-site personnel.

Fueling of some construction vehicles would occur in the construction area. Other mobile equipment would return to the on-site laydown area for refueling. Special procedures would be identified to minimize the potential for fuel spills, and spill control kits would be carried on all refueling vehicles for activities such as refueling, vehicle or equipment maintenance procedures, waste removal and tank clean-out. Fuel for construction equipment could be provided by a fuel truck or could be stored on-site in aboveground double-walled storage tanks with built-in containment. The volume of each individual tank would not exceed 1,320 gallons, the threshold above which a Spill Prevention, Countermeasure and Control (SPCC) Plan may be required (40 CFR 112). However, because there could be multiple fuel tanks for different fuels (i.e., gasoline and diesel) in addition to the volume of oil contained in the main electrical transformers, the reasonable maximum volume of the on-site inventory anticipated at 32,000 gallons, the total volume of regulated materials would likely exceed the threshold. Consequently, an SPCC Plan would be prepared.

The SPCC Plan would include procedures, methods, and equipment supplied during construction to prevent discharges from reaching navigable waters. The plan would be certified by a Registered Professional Engineer and a complete copy maintained on-site. The local administering agency is the USEPA; however, ADEM is the local Certified Unified Program Agency that is responsible for inspections and approvals related to the SPCC program.

During operations, a variety of chemicals and hazardous materials would be stored and used at the facility. Chemicals would be stored inside the O&M building (in appropriate chemical storage containers), as appropriate, to prevent exposure to the elements and to reduce the potential for accidental releases. Bulk chemicals would be stored in storage tanks; other chemicals would be stored in returnable delivery containers. Chemical storage and chemical feed areas would be designed to contain leaks and spills. Containment berm and drain piping design would accommodate a full-tank capacity spill without overflowing the containment berms. For multiple tanks located within the same bermed area, the capacity of the largest single tank would determine the volume of the bermed area and drain piping. The transport, storage, handling, and use of all chemicals would be conducted in accordance with applicable laws, ordinances, regulations, and standards.

The quantities of hazardous materials stored on-site would be evaluated to identify the required usage and to maintain sufficient inventories to meet use rates without stockpiling excess chemicals. Chemicals that could be present during construction, O&M of the Proposed Project are included in Table 3.10-2.

Table 3.10-2.
Summary of Special Handling Precautions for Large Quantity Hazardous Materials

Hazardous Material	Use	Relative Toxicity[1] and Hazard Class[2]	Permissible Exposure Limit	Storage Description; Capacity	Storage Practices and Special Handling Precautions
Diesel Fuel	Equipment refueling and emergency diesel fire pump	Low toxicity; Hazard class – Combustible liquid	PEL: none established TLV: 100 mg/m^3	Carbon steel tank (3,600 gallons)	Secondary containment, overfill protection, vapor recovery, spill kit.
Hydraulic fluid (if applicable)	Tracker drive units	Low to moderate toxicity; Hazard class – Class IIIB combustible liquid	TWA (oil mist): 5 mg/m^3 STEL: 10 mg/m^3	Hydraulic drive tank, approximately 20 gallons per tracker drive unit (if applicable) throughout solar field. Carbon steel tank, maintenance inventory in 55-gallon steel drums.	Found only in equipment with a small maintenance inventory. Maintenance inventory stored within secondary containment; alternative measures to secondary containment for equipment would be implemented at the project.
Lube Oil	Lubricate rotating equipment (*e.g.,* tracker drive units)	Low toxicity Hazard class – NA	None established	Carbon steel tank, maintenance inventory in 55-gallon steel drums.	Secondary containment for tank and for maintenance inventory.
Mineral and FR3 Insulating Oil	Transformers	Low toxicity Hazard class – NA	None established	Carbon steel transformers; total on-site inventory of approximately 250,000 gallons (each inverter transformer contains approximately 500 gallons per MVA). Carbon steel tank, maintenance inventory in 55-gallon steel drums.	Used only in transformers, secondary containment for each transformer. Maintenance inventory stored within secondary containment; alternative measures to secondary containment for equipment would be implemented at the project.
Sulfur Hexafluoride	230-kV breaker insulating medium			Contained within switchyard equipment; maximum of 7500 lbs	None stored on-site except in equipment.

Table 3.10-2.
Summary of Special Handling Precautions for Large Quantity Hazardous Materials

Hazardous Material	Use	Relative Toxicity[1] and Hazard Class[2]	Permissible Exposure Limit	Storage Description; Capacity	Storage Practices and Special Handling Precautions
Acetylene	Welding gas	Moderate toxicity; Hazard class – Toxic	PEL: none established	Steel cylinders; 200 cubic feet each, 600 cubic feet total on-site	Inventory management, isolated from incompatible chemicals.
Argon	Welding gas	Low toxicity; Hazard class – Nonflammable gas	PEL: none established	Steel cylinders; 200 cubic feet each, 600 cubic feet total on-site	Inventory management.
Oxygen	Welding gas	Low toxicity; Hazard class – Oxidizer	PEL: none established	Steel cylinders; 200 cubic feet each, 600 cubic feet total on-site	Inventory management, isolated from incompatible chemicals.

PEL – permissible exposure limit
TLV – threshold limit value
TWA – time weighted average
STEL – short-term exposure limit

1 Low toxicity is used to describe materials with an NFPA Health rating of 0 or 1. Moderate toxicity is used describe materials with an NFPA rating of 2. High toxicity is used to describe materials with an NFPA rating of 3. Extreme toxicity is used to describe materials with an NFPA rating of 4.
2 NA denotes materials that do not meet the criteria for any hazard class defined in the 1997 Uniform Fire Code.

If a portable, trailer-mounted water treatment system can meet the Proposed Action's flow and water quality demands, no additional chemicals would be required for maintenance and regeneration of the system. However, if a site-specific water treatment system is used, the regeneration process could require additional chemicals to maintain its performance. Such chemicals could include one or more of the following:

- Sodium Hydroxide solution;
- Sodium Hypochlorite solution; and
- Sulfuric Acid solution.

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

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

Hazardous Waste

Small quantities of hazardous wastes would be generated during construction, operation and maintenance and decommissioning. Hazardous wastes generated during the construction phase would include substances such as paint and primer, thinners, and solvents. Hazardous solid and liquid waste streams that would be generated during operation of the Proposed Project include substances such as used hydraulic fluids, used oils, greases, filters, etc., as well as fluorescent light bulbs, spent cleaning solutions and spent batteries. Hazardous wastes generated during decommissioning would include substances such as: carbon dioxide, diesel fuel, hydraulic fuel and lube oil. To the extent possible, all hazardous wastes would be recycled. Waste collection and disposal would be conducted in accordance with applicable regulatory requirements to minimize health and safety effects.

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

Solid (Non-Hazardous) Waste

Construction, operation and maintenance, and decommissioning would generate non-hazardous solid wastes. Facility-related wastes generated during all phases of the Proposed Project would include oily rags, worn or broken metal and machine parts, defective or broken electrical materials, other scrap metal and plastic, insulation material, empty containers, paper, glass, and other miscellaneous solid wastes including the typical refuse generated by workers. These materials would be disposed by means of contracted refuse collection and recycling services. Waste collection and disposal would be in accordance with applicable regulatory requirements to minimize health and safety effects.

Information on universal wastes anticipated to be generated during Project construction is provided in Table 3.10-3. Universal wastes and unusable materials would be handled, stored, and managed per General Universal Waste requirements.

Table 3.10-3.
Summary of Construction Waste Streams and Management Methods

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-site Treatment	Waste Management Method/Off-site Treatment
Construction waste - Hazardous	Empty hazardous material containers	1 cubic yard per week (cy/wk)	Intermittent	None. Accumulate on-site for <90 days	Return to vendor or dispose at permitted hazardous waste disposal facility
Construction waste – Hazardous	Solvents, used oil, paint, oily rags	175 gallons	Every 90 days	None. Accumulate on-site for <90 days	Recycle or use for energy recovery
Spent batteries - Universal Waste	Lead acid, alkaline type	20 in 2 years	Intermittent	None. Accumulate on-site for <90 days	Recycle
Construction waste – Non-hazardous	Scrap wood, concrete, steel, glass, plastic, cardboard, paper	5 cy/week	Intermittent	None	Recycle wherever possible, otherwise dispose to Class III landfill
Sanitary waste – Non-hazardous	Portable chemical toilets - sanitary waste	200 gallons/ day	Periodically pumped to tanker truck by licensed contractors	None	Ship to sanitary wastewater treatment plant
Office waste – Non-hazardous	Paper, aluminum, food	1 cy/week	Intermittent	None	Recycle or dispose to Class III landfill

The operation of the solar farm is expected to generate sanitary wastewater, non-hazardous wastes, and small quantities of hazardous wastes. Operation of the transmission line would generate minimal quantities of waste. The types of waste and their estimated volumes are summarized in Table 3.10-4.

Table 3.10-4.
Summary of Operation Waste Streams and Management Methods

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	Waste Management Method	
				On-site	Off-site
Used Hydraulic Fluid, Oils and Grease – Non-RCRA Hazardous	Tracker drives, hydraulic equipment	1000 gallons/year	Intermittent	Accumulated for <90 days	Recycle

Table 3.10-4.
Summary of Operation Waste Streams and Management Methods

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	Waste Management Method	
				On-site	Off-site
Oily rags, oil absorbent, and oil filters – Non RCRA Hazardous	Various	One 55-gallon drum per month	Intermittent	Accumulated for <90 days	Sent off-site for recovery or disposed at Class I landfill
Spent batteries – Universal Waste	Rechargeable and household	<10/month	Continuous	Accumulate for <1 year	Recycle
Spent batteries –Hazardous	Lead acid	20 every 2 years	Intermittent	Accumulated for <90 days	Recycle
Spent fluorescent bulbs – Universal Waste	Facility lighting	< 50 per year	Intermittent	Accumulate for <1 year	Recycle
Sanitary wastewater – Nonhazardous	Toilets, washrooms	250 gallons/day	Continuous	pump out septic holding tank	None

Wastewater

Portable chemical toilets would be provided for workers in the solar fields. A sanitary wastewater system would collect sanitary wastewater at the O&M building. The sanitary wastewater from sinks, toilets, showers, other sanitary facilities in the O&M building would be discharged to a sanitary septic system and a pump out septic holding tank. The septic system would be designed and permitted in accordance with Lauderdale County regulations. No adverse effects are anticipated from wastewater treatment and disposal.

3.11 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

This section describes an overview of existing public health and safety, and the potential impacts associated with the Proposed Action and the project alternatives. Public health issues include emergency response and preparedness to ensure project construction and operations do not pose a threat to public health and safety. Safety issues include occupational (worker) safety in compliance with the OSHA standards.

3.11.1 Affected Environment – Public and Occupational Health and Safety

The project area is currently private property. Land uses on the sites are primarily agricultural or unused with a small amount of residential use, though no persons currently live within the proposed site footprint. Since the land occupied by the sites is not used by, or accessible to the general public, there are no current public health and safety issues.

Public emergency services in the area include a regional hospital, law enforcement services, and fire protection services. The Eliza Coffee Memorial Hospital is located in Florence; there are also two urgent care centers in Florence. Law enforcement services in the City of Florence are provided by the Florence Police Department; Lauderdale County law enforcement services are provided by the Lauderdale County Sheriff's Department. Both the police department headquarters and the sheriff's office are located in Florence. Fire protection services are provided by the Oakland Volunteer Fire Department and the Florence Fire Rescue. The nearest fire station to the project site is located in Oakland on County Road 15, approximately two miles and five minutes from the project site. The Alabama Emergency Management Agency has the responsibility and authority to coordinate with state and local agencies in the event of a release of hazardous materials in association with project activities.

3.11.2 Environmental Consequences – Public and Occupational Health and Safety

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

3.11.2.1 No Action Alternative

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

3.11.2.2 Proposed Action

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

Potential public health and safety hazards could result in association with the flow of construction traffic along the public roadways. One adjacent residence is located along CR 62, which would be used by construction traffic to access the project site. Awareness of this residence and establishment of traffic procedures to minimize potential safety concerns should be addressed in the health and safety plans established and followed by the construction team.

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

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

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

3.12 TRANSPORTATION

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

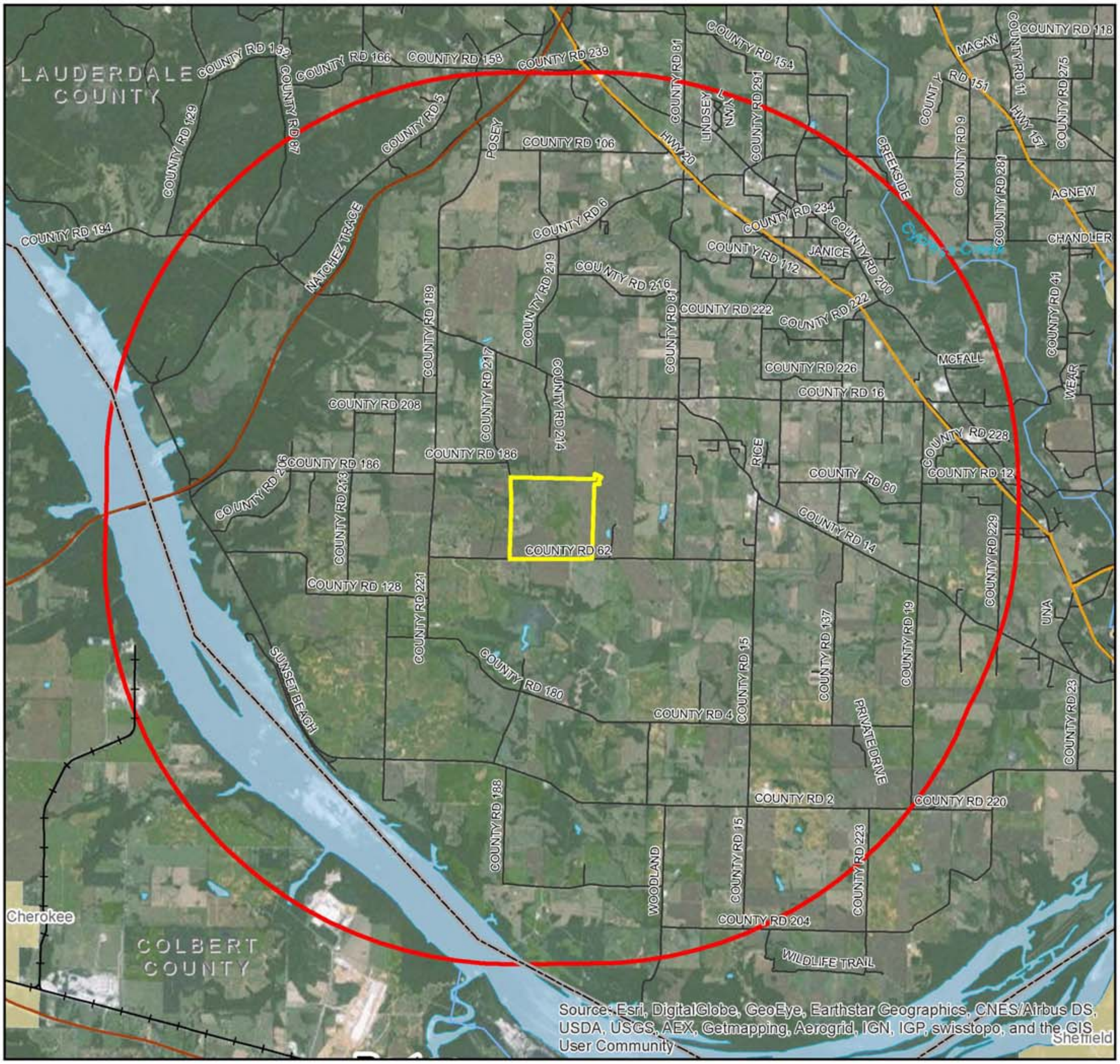
3.12.1 Affected Environment – Transportation

3.12.1.1 Roads

The project site is located in rural Lauderdale County, west of the City of Florence, at the intersection of County Road (CR) 62 and CR 217. These roads are the southern and western boundaries of the project site, respectively. The majority of the smaller county roads around the site are utilized primarily by agricultural workers, homeowners and/or their visitors. Many of these rural roads terminate in residential areas, though some connect to other county roads. No public roads are present within the project boundaries where gravel and dirt roads provide vehicular access to the agricultural fields and the farm equipment building.

Lauderdale CR 62 is a two lane paved road that runs east-west along the southern boundary of the project site. CR 62 terminates to the east at the intersection with CR 15 and to the west at CR 189. CR 217 is a two lane unpaved road which begins at CR 62 on the south end and terminates at the intersection with CR 14 to the north (Figure 15).

The nearest major highways are State Highway 20, approximately five miles east of the project site and the Natchez Trace Parkway, approximately five miles northwest. Both these roads are considered rural minor arterials by the Alabama Department of Transportation (ADOT) (ADOT 2015a).



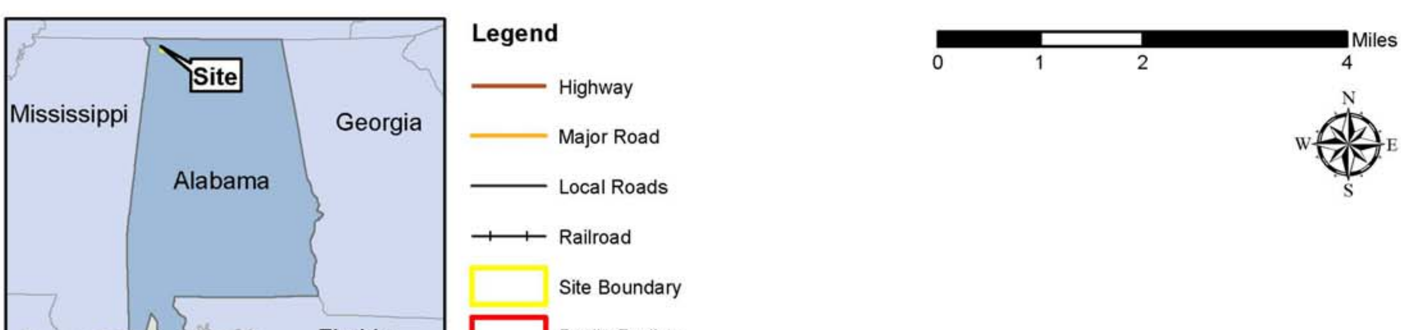


Figure 15
Transportation Resources Map

Source: ArcGIS Aerial Map

3.12.1.2 Traffic

Existing traffic volumes were determined using Average Annual Daily Traffic (AADT) counts measured at exiting ADOT stations. The 2013 AADT for State Highway 20 was 5,600 vehicles measured at station 322 just north of Country Club Road; 6960 vehicles at station 321 just north of Waterloo Road; 6,090 vehicles at station 320 just north of Gunwhale Ford Road; and 7,060 vehicles at station 319 at Cypress Creek Road. Traffic data was not available for any other roads in the vicinity of the project site (ADOT 2013). The county roads around the project site support levels of traffic relatively typical for rural Alabama.

3.12.1.3 Rail and Air Traffic

The Tennessee Southern Railroad Company operates a track which runs roughly parallel to State Road 17. It intersects with two Norfolk Southern lines across the Tennessee River from the project site. The line passes several miles east of the project site and travels through Florence (ADOT 2015b). The Tennessee Southern Railroad Company operates a total of 149 miles of rail running from Columbia, Tennessee to Florence with nine miles of track located in Alabama. The company also operates intermodal facilities in its port facility in Florence, integrating rail, barge and truck transportation services (Patriot Rail 2015).

The closest major airport is the Huntsville International Airport, in Huntsville Alabama, approximately 75 miles east of the project site. The closest regional airport is the Northwest Alabama Regional Airport in Muscle Shoals, approximately ten miles southeast of the project site. In 2014, approximately 1,500 passengers traveled through the airport on 422 flights. The majority of these passengers traveled to Atlanta, Georgia, presumably for connecting flights (Northwest Alabama Regional Airport 2015).

3.12.2 Environmental Consequences – Transportation

This section describes the potential impacts to transportation resources should the Proposed Action or alternatives be implemented.

3.12.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar project 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 at present.

3.12.2.2 Proposed Action

The construction and operation of the proposed solar project would have no effect on rail traffic or the operation of the airports in the region. The operation of the solar farm would not affect commercial air passenger or freight traffic in the region and would not adversely affect any crop dusters operating in the vicinity of the site.

During construction of the proposed solar project, an average crew of between 30 and 162 workers would be present at the project site from approximately 7 am to 5 pm, four to seven days a week, for approximately 12 months. A majority of these workers would likely come from the local or regional area. The other workers would come from outside the region and many would likely stay in local hotels in Florence or Muscle Shoals. Workers would either drive their own vehicles or carpool to the project site. Parking would be on-site during the day. The work teams would be released during the lunch break and some would likely visit local restaurants and businesses at this time. Additional traffic due to deliveries and waste removal would consist of a maximum of approximately 15 vehicles per day for six months during construction.

Traffic flow around the work site would, therefore, be heaviest at the beginning of the work day, at lunch, and at the end of the work day. Workers and deliveries would access the project site from the east on CR 62. Although traffic along CR 62 is not monitored by the ADOT, there are no major industries or populated places along this road in the vicinity of the project site. There is one residence located on CR 62 (immediately to the south of the site) that has the potential to be impacted by construction traffic. Should traffic flow be a problem, River Bend would consider staggered work shifts to space out the flow of traffic to and from the project site. River Bend would also consider posting a flag person during the heavy commute periods to manage traffic flow and to prioritize access for local residents. Use of such mitigation measures would minimize potential adverse impacts to traffic and transportation to less than significant levels.

Construction equipment and material delivery would require approximately 15 semi-tractor trailer trucks or other large vehicles visiting the site per day during a six-month portion of the construction activities. The total number of deliveries to the site is estimated at approximately 1,400 over the entire 12 month construction period. These vehicles should be easily accommodated by existing roadways; therefore, only minor impacts to transportation resources in the local area would be anticipated as a result of construction vehicle activity.

Several on-site maintenance access roads would be maintained on the site. Specifically, River Bend would construct an up to 20-ft permanent gravel access road on the site connecting the entryway from CR 62 to the operations building (Figure 3). Additional entryways would be located along the dirt road which forms the eastern boundary of the site and from CR 217 on the west side of the site. Following construction, the gravel roads would be maintained to allow periodic access for site inspection and maintenance. They would be closed to through traffic.

Due to the site's proximity to the City of Florence, possible minor traffic impacts along State Highway 20 could occur. Workers could potentially commute from Florence and Muscle Shoals. However, as the proposed workforce would consist of a maximum of 162 employees, for only part of the duration of construction, the addition of these vehicles to the existing traffic on State Highway 20 would be considered insignificant.

During operation of the solar facility, an estimated three full time employees would travel to and from the site daily. Periodic washing of the solar panels would increase this number by 12 employees and water trucks would be present on-site temporarily for approximately 30 days no more than twice a year. This increased traffic should not have a significant impact on the local roadways.

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

3.13 SOCIOECONOMICS

This section describes an overview of existing socioeconomic conditions within the Project Area and the potential impacts that would be associated with the Proposed Action and No Action alternative. Components of socioeconomic resources that are analyzed include population, employment, and income.

3.13.1 Affected Environment – Socioeconomics

The proposed project site is located in the southern part of Lauderdale County, Alabama, approximately 5 miles west of the City of Florence, and about 75 miles west of Huntsville. Lauderdale County is the impact area for socioeconomic resources.

3.13.1.1 Population

The population of Lauderdale County, as reported in the 2010 US Census of Population, is 92,709, 39,339 of whom live in Florence. As projected by the state of Alabama, the population of the county would be about 97,835 by 2030. Census tract 112, which contains the proposed solar project site as well as the unincorporated Town of Oakland, has a population of 4,023. Population trends and projections are presented in Table 3.13-1.

Table 3.13-1.
1990 – 2030 Population Data

Area	1990	2000	2010	Projection 2030	Percent Increase 1990-2010	Percent Increase 2010-2030
Lauderdale County	79,661	87,966	92,709	97,835	14.1	5.2
Census Tract 112	3,520	4,090	4,023	NA	12.5	NA
Alabama	4,040,587	4,447,100	4,779,736	4,874,243	15.5	1.9
United States	248,709,873	281,421,906	308,745,538	373,504,000	24.1	21.0

Source: Center for Business and Economic Research, The University of Alabama, November 2014. U.S Census Bureau (USCB) 1990a, USCB 1990b, USCB 2000, USCB 2008, USCB 2010a.

3.13.2 Employment and Income

Lauderdale County has a total employment of about 42,961 jobs (Table 3.13-2). Approximately 3.6 percent are employed in farming, above both the national level of 0.95 percent and the state level of 1.9 percent. Manufacturing provides 9.5 percent of the jobs, more than the national share of 8.5 percent, but less than the state share of 10.2 percent. Retail trade is slightly higher than the state and national shares, while government employment is below both the state share and the national share. The March 2015 unemployment rate for Lauderdale County was 6.6 percent; this represents a decrease of 0.7 percent from March 2014 (Bureau of Labor Statistics 2015).

Table 3.13-2.
2013 Employment Data

Area	Total Employment	Percent Farm	Percent Manufacturing	Percent Retail Trade	Percent Government
Lauderdale County	42,961	3.6	9.5	14.7	12.7
Alabama	2,542,368	1.9	10.2	10.8	15.8
United States	1,414,111,000	0.95	8.5	10.8	17.2

Source: United States Bureau of Economic Analysis (BEA) 2013a, BEA 2013b.

Per capita personal income in Lauderdale County in 2013 was $33,907, 75.7 percent of the national average of $44,765 and less than the state average of $36,481 (Table 3.13-3).

Table 3.13-3.
2013 Per Capita Personal Income Data

Area	Per Capita Personal Income	Percent of US
Lauderdale County	33,907	75.7
Alabama	36,481	81.5
United States	44,765	100.0

Source: BEA 2013c.

3.13.3 Environmental Consequences – Socioeconomics

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

3.13.3.1 No Action Alternative

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

3.13.3.2 Proposed Action

Under the Proposed Action, a new solar facility would be built at the project site. Construction activities at the site would take approximately 12 months to complete and an average crew of 150 workers would be employed for the installation with approximately 162 workers at the site during the peak of construction. Workers would include a mix of general laborers, electrical technicians, and journeyman-level electricians. Work would generally occur five days a week from 7 am to 7 pm. Occasionally work would proceed 7 days a week. There would be short-term beneficial economic impacts from construction activities associated with the project, including the purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers were obtained. It is likely some construction materials and services would be purchased locally in the Lauderdale County area, as well as in adjacent counties. Also, the majority of the construction workforce would likely be from local or regional sources. A small portion of the workforce would come from out-of-state. The direct impact to the economy associated with construction would be short-term and beneficial.

The majority of the indirect employment and income impacts would be from expenditure of the wages earned by the workforce involved in construction activities, as well as the local workforce used to provide materials and services. Construction of the proposed project could have minor beneficial indirect impacts to population and short-term employment and income levels in Lauderdale County and the larger Florence-Muscle Shoals metropolitan area. During operation of the solar project, there would be three full time employees on-site and a temporary workforce of 12 employees during the panel cleaning activities. Inspection or maintenance workers would also visit the site as needed.

Operations of the Project would have a small positive impact on employment in Lauderdale County. In addition to the small regular workforce at the facility, grounds maintenance and other specific contracts for project operations would most likely be local and ongoing on a regular basis.

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

3.14 ENVIRONMENTAL JUSTICE

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

3.14.1 Affected Environment – Environmental Justice

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

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

- *Minority individuals.* Individuals who identify themselves as members of the following population groups: American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Black, Hispanic, or two or more races.

- *Minority populations.* Minority populations are identified where (1) the minority population of an affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

- *Low-income populations.* Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P-60, on Income and Poverty.

According to CEQ guidance, US Census data are typically used to determine minority and low-income population percentages in the affected area of a project in order to conduct a quantitative assessment of potential environmental justice impacts. The project site that would be affected by the Proposed Action is located in the southern part of Lauderdale County, near the City of Florence. Census Tract 112, which contains the proposed site as well as the unincorporated Town of Oakland, is identified as the impact area for environmental justice. The site is located in Census Block 2017, which is part of Block Group 2. However, the Census reports a population of zero for Block 2017.

3.14.1.1 Minority Population

Minorities constitute 13.6 percent of the total population in Lauderdale County as of the 2010 US Census of Population (Table 3.14-1). Census Tract 112, which contains the project site, has a minority population of 14.1 percent. Block Group 2, which contains the project site, has a minority population of 21.2 percent. Census Tract 112 and Block Group 2 have a greater proportion of minorities (14.1 and 21.2 percent, respectively) than does the county as a whole (13.6 percent). However, these levels are below the state average of 31.5 percent and less than the national average of 36.3 percent.

Table 3.14-1.
2010 Minority Population Data

Area	Total Population	Minority Population	Percent Minority Population
Census Tract 112	4,023	569	14.1
Block Group 2	1,001	212	21.2
City of Florence	4,396	851	19.4
Lauderdale County	92,709	12,597	13.6
Alabama	4,779,736	1,504,342	31.5
United States	308,745,538	111,927,986	36.3

Source: USCB 2010b.

3.14.1.2 Poverty

The portion of the population in Lauderdale County that had income below the poverty level during the period from 2006 to 2010 was 17.7 percent (Table 3.14-2). Census Tract 112 contained 20.4 percent of the population below the poverty level. Block Group 2, which contains the project site, had 31.5 percent of the population living below the poverty level in 2000. These levels are above the state average of 19.0 percent and the county level of 17.7 but similar to or below the City of Florence level of 27.6 percent. Therefore, the block group in the vicinity of the proposed solar site can be considered a low-income community.

Table 3.14-2.
2000 – 2010 Poverty Level Data

Area	Total Population	Persons Below Poverty Level	Percent of Persons Below Poverty Level
Census Tract 112	3,882	790	20.4
Block Group 2	885*	279*	31.5
City of Florence	4,234	1,167	27.6
Lauderdale County	89,741	15,897	17.7
Alabama	4,666,970	888,290	19.0
United States	296,141,149	40,917,513	13.8

* Data from 2000 Census, 2010 data is not available for Block Group 2, Tract 112, Lauderdale Alabama.
Source: USCB 2010c; USCB 2000

3.14.2 Environmental Consequences – Environmental Justice

This section describes the potential environmental justice impacts should the Proposed Action or No Action alternatives be implemented. Executive Order 12898 (59 FR 7629) directs Federal agencies to identify and address, as appropriate, potential disproportionately high and adverse human health or environmental impacts on minority and low-income populations. According to the CEQ, adverse health effects to be evaluated within the context of environmental justice impacts may include bodily impairment, infirmity, illness, or death. Environmental effects may include ecological, cultural, human health, economic, or social impacts. Disproportionately high and adverse human health or environmental effects occur when the risk or rate of exposure to an environmental hazard or an impact or risk of an impact on the natural or physical environment for a minority or low-income population is high and appreciably exceeds the impact level for the general population or for another appropriate comparison group (CEQ 1997).

3.14.2.1 No Action Alternative

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

3.14.2.2 Proposed Action

Based on the analysis presented in Section 3.14.1, residents of the Census blocks or block group containing the site are not considered a minority population but can be considered a low-income community. Based on the analysis of impacts for all resource areas presented in this EA, it was determined that there would be no significant adverse health impacts on members of the public or significant adverse environmental impacts on the physical environment (water, air, aquatic, and terrestrial resources) and socioeconomic conditions. Therefore, there would be no disproportionately high or any adverse direct or indirect impacts on minority or low-income populations due to human health or environmental effects resulting from the Proposed Action.

CHAPTER 4

4.0 CUMULATIVE IMPACTS

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

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

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

On 27 April and 7 May 2015, AECOM contacted local City and County officials, including the Florence, Alabama Planning and Building Departments to gather information on current and foreseeable local projects. Despite follow-up phone calls and emails, no officials have responded to AECOM's information requests.

4.1 FEDERAL PROJECTS

There was a federally-funded project in the vicinity of the project site; the Hermitage Drive Bridge Replacement Project was located approximately 10 miles east-southeast of the Project. The Bridge Project involved widening the bridge over Bluewater Creek from two lanes to four lanes (ADOT 2015c). It temporarily restricted traffic on Highway 72 to a single lane during construction; however, this project was completed in April 2015 so it would not contribute to cumulative impacts. TVA is retiring the coal-fueled generating units at its Colbert Fossil Plant, located in Colbert County about 5 miles south of the project site. The natural gas-fueled generating units at Colbert would continue to be operated. This would result in a long-term workforce reduction at the site. TVA is also in the process of selling surplus portions of its large Muscle Shoals reservation for redevelopment (TVA 2015b, 2015c). Neither of these actions is likely to contribute to any identifiable cumulative impacts associated with the Proposed Action. Therefore, federal projects in the area would not result in cumulative impacts associated with the Proposed Action.

4.2 STATE AND LOCAL PROJECTS

There are two state and locally funded projects in the vicinity with the potential to contribute to cumulative impacts associated with transportation and socioeconomics. The first project is an undertaking by the City of Florence to improve the drainage near the intersection of Ingleside Drive and Hermitage Drive (approximately 10 miles east-southeast of the project site location).

The drainage improvement project consists of replacing the existing storm sewer culvert with a larger culvert system (City of Florence 2015b). Although this project is close to the Hermitage Drive bridge replacement project, it is unlikely to contribute to cumulative impacts related to the Proposed Action. It is a relatively small project which should be completed prior to the proposed start of the Project.

The second project is a planned expansion and upgrade of the Northwestern Alabama Regional Airport in Muscle Shoals (approximately 14 miles southeast of the project site). The Southwest Development project is a plan for the growth of the airport due to the lack of development space adjacent to the existing terminal (Northwest Alabama Regional Airport 2015b). The plan involves expanding the existing airport capacity with a new taxi lane and apron and a potential three new hangars for future tenants (Northwest Alabama Regional Airport 2015c). Although the preliminary plan only addresses the northwest corner of the airport property, future plans would include offering a large area for business activities. The Shoals Economic Development Authority describes the airport business park site as consisting of 470 acres, with 430 acres of industrially zoned space still available. The site has access to Rail, Highway, Air and Water transportation opportunities (Shoals Economic Development Authority 2015b). Although this planned airport and research park expansion may impact local transportation and socioeconomics, it is not likely to contribute to cumulative impacts associated with the proposed Project. It is located across the Tennessee River from the project site, and would be constructed in phases, over time, as tenants purchase or lease space.

CHAPTER 5

5.0 LIST OF PREPARERS

Table 5-1 summarizes the expertise and contribution made to the EA by the Project Team.

Table 5-1.
Environmental Assessment Project Team

Name/Education	Experience	Project Role
TVA		
Charles P. Nicholson Ph.D., Ecology and Evolutionary Biology; M.S., Wildlife Management; B.S., Wildlife and Fisheries Science	37 years in zoology, endangered species studies, and NEPA compliance	NEPA Compliance and Document Preparation
W. Richard Yarnell B.S., Environmental Health	40 years in cultural resource management	Section 106 cultural resource compliance
Holly LeGrand M.S., Wildlife B.S., Biology	15 years in combined wildlife studies, endangered species studies, ESA compliance and NEPA compliance	Section 7 ESA Compliance, terrestrial zoology
Emily P. Willard B.S., Environmental Science	8 years in environmental compliance, preparation of environmental review documents	Coordination of TVA transmission system interconnection actions
AECOM		
Roberta A. Hurley M.A., Chemistry; B.S., Chemistry; B.S., Biology	30 years in regulatory and NEPA compliance, including project management and public outreach	EA Project Manager
Erika A. Grace M.S., Environmental Toxicology; B.S., Biological Sciences	9 years in NEPA coordination and document preparation; 9 years in environmental services and technical evaluations	NEPA Project Coordinator, Document Preparation
Carol Butler Freeman M.S., Space Studies; M.S., Geological Sciences; B.S., Geology	20 years in scientific and technical research, including NEPA and NHPA compliance and geologic field work	Purpose and Need; Alternatives; Geology and Soils; Noise; Transportation; Waste Management; Public Health and Safety

Table 5-1.
Environmental Assessment Project Team

Name/Education	**Experience**	**Project Role**
Zoe Knesl M.S., Marine Science; B.A., Integrative Biology and Studio Art	10 years in NEPA evaluation; 17 years in biological and environmental studies and analysis; 3 years in visual and aesthetic impacts analysis	Alternatives; Land Use; Water Resources; Biological Resources; Visual Resources; Air Quality & Climate Change
Kirk A. Freeman M.A., History; B.A. Anthropology/Archaeology	20 years in cultural resource management	Cultural Resources

CHAPTER 6

6.0 REFERENCES

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