Document Type: EA-Administrative Record
Index Field: Final EA
Project Name: Bellefonte Solar Energy Center
Project Number: **2019-10**

BELLEFONTE SOLAR ENERGY CENTER

Jackson County, Alabama

FINAL
ENVIRONMENTAL ASSESSMENT

Prepared for:
Tennessee Valley Authority
Knoxville, Tennessee

Submitted By:
Bellefonte Solar, LLC

Prepared By:
HDR, Inc.

April 2020

For Information, contact:
Elizabeth Smith
Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, Tennessee 37902
Phone: 865-632-3053
Email: esmith14@tva.gov

Table of Contents

List of Tables

List of Photos

List of Figures

List of Appendices

SYMBOLS, ACRONYMS, AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AC	Alternating current
ACS	American Community Survey
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AHC	Alabama Herbarium Consortium
ALDOT	Alabama Department of Transportation
APE	Area of Potential Effect
APHIS	Animal and Plant Health Inspection Service
APLIC	Avian Power Line Interaction Committee
AST	Above ground storage tank
ASTM	American Society for Testing and Materials
B.P.	Before Present
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BG	Block Group
BGEPA	Bald and Golden Eagle Protection Act
BHAD	Bellefonte Historic Archaeological District
BMP	Best management practice
CBMPP	Construction Best Management Practices Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
CR	County road
CT	Census Tract
CWA	Clean Water Act
CWDB	Civil War Defenses of Bellefonte
dB	Decibels
dBA	A-weighted decibels
DBH	Diameter at breast height
DC	Direct current
DNL	Day-night average sound level
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Environmental Site Assessment
EO	Executive Order
ESA	Endangered Species Act
°F	Fahrenheit
FEMA	Federal Emergency Management Agency

FIRM	Flood Insurance Rate Map
FP	Fossil Plant
FPPA	Farmland Protection Policy Act
GHG	Greenhouse gas
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Conservation
IRP	Integrated Resource Plan
kV	Kilovolt
M&C RR	Memphis & Charleston Railroad
MBTA	Migratory Bird Treaty Act
MPT	Main power transformer
MWh	Megawatt hour
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
No.	Number
NO_x	Nitrogen oxides
NP	Nuclear Plant
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NTP	Notice to Proceed
NWP	Nationwide Permit
OHGW	overhead ground wire
OPGW	optical ground wire
OSHA	Occupational Safety and Health Administration
PEM	Palustrine emergent
PFO	Palustrine forested
PMT	Padmount transformer
$PM_{2.5}$	Particulate matter whose particles are less than or equal to 2.5 micrometers
PM_{10}	Particulate matter whose particles are less than or equal to 10 micrometers
PPA	Power purchase agreement
PPE	Personal protective equipment
PRT	Potential Roost Trees
PSS	Palustrine scrub-shrub
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
REC	Recognized environmental conditions

RFP	Request for proposal
RNHD	Regional Natural Heritage Database
ROW	Right-of-way
SHPO	State Historic Preservation Officer
SO_2	Sulfur dioxide
SMZ	Streamside management zone
SPCC	Spill Prevention, Countermeasure and Control
SR	State route
SWCC	Soil and Water Conservation Committee
TL	Transmission line
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
UST	Underground storage tank
WQC	Water quality certification
VOC	Volatile organic compound

CHAPTER 1

1 INTRODUCTION

Tennessee Valley Authority (TVA) entered into a power purchase agreement (PPA) with Bellefonte Solar, LLC (Bellefonte Solar), an affiliate of NextEra Energy Resources, LLC, to purchase the power generated by the proposed Bellefonte Solar Energy Center. The proposed solar photovoltaic (PV) facility would be located in Jackson County, Alabama. The proposed facility would be constructed and operated by Bellefonte Solar and would have alternating current (AC) generating capacity of up to 150 megawatts (MW). To interconnect to TVA's existing electrical grid, TVA would construct a new Hollywood 161-kV (kV) switching station adjacent and connected to its existing Hollywood-Scottsboro 161-kV transmission line (TL). Bellefonte Solar would construct the Bellefonte Solar 161-kV substation adjacent and connected to the new TVA Hollywood 161-kV switching station, resulting in a 0.1-mile generation tie (gen-tie) line between the substation and the switching station. TVA would also replace existing groundwire with fiber-optic overhead groundwire (OPGW) on 5.2 miles of the Hollywood-Scottsboro 161-kV TL. Under the terms of the conditional PPA between TVA and Bellefonte Solar, dated November 9, 2018, TVA would purchase the electric output generated by the proposed solar facility for an initial term of 20 years, subject to satisfactory completion of all applicable environmental reviews. Together, the proposed solar facility, the interconnection facilities, and the PPA between Bellefonte Solar and TVA are herein referred to as the "Project" or the "Proposed Action."

The proposed solar facility would occupy 997 acres of a Project Site consisting of portions of 14 individual parcels encompassing approximately 1,850 acres of land (Figure 1-1 and Figure 2-1). The Project Site is located partially within the incorporated limits of the Town of Hollywood and partially in an unincorporated portion of southern Jackson County, Alabama, approximately three miles northeast of the City of Scottsboro. The solar facility components would consist of a solar array containing PV panels attached to ground-mounted single-axis trackers, central inverters, medium voltage transformers, one main power transformer (MPT), internal site access roads, and all associated cabling and safety equipment (Figure 2-2, Figure 2-3, and Figure 2-4). A project substation that includes the MPT and Hollywood 161-kV switching station would be constructed adjacent to an existing Hollywood-Scottsboro 161-kV TL through the Project Site. Several pole structures would be replaced and approximately 5.2 miles of OPGW would be installed on this TL.

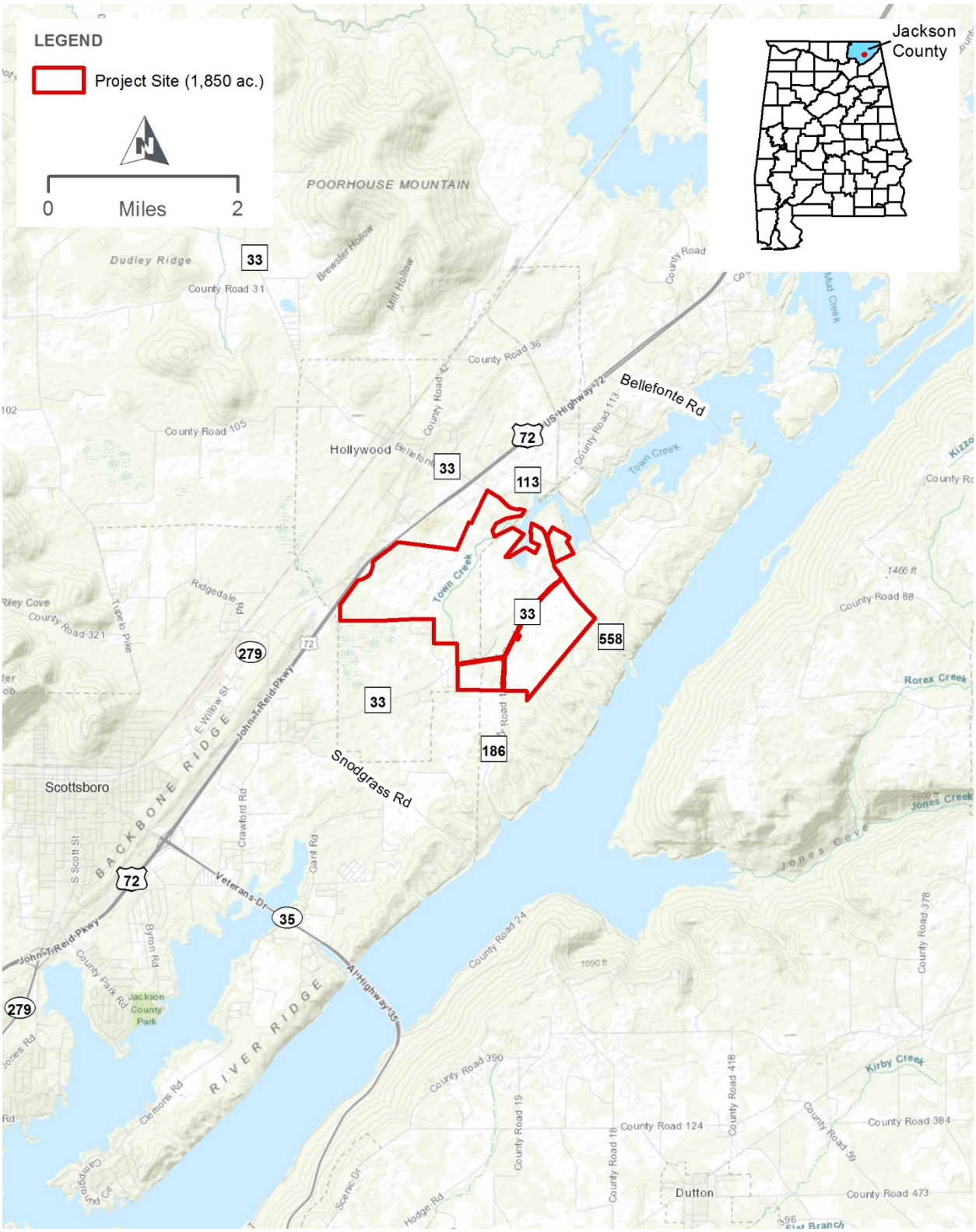

Figure 1-1. Bellefonte Solar Energy Center Project Site in Jackson County, Alabama

1.1 PURPOSE AND NEED FOR ACTION

TVA produces or obtains electricity from a diverse portfolio of energy sources, including solar, hydroelectric, wind, biomass, fossil fuel, and nuclear. In 2015, TVA completed an Integrated Resource Plan (IRP) and associated Environmental Impact Statement (EIS) (TVA 2015). The IRP identified the various resources that TVA intends to use to meet the energy needs of the TVA region over the 20-year planning period while achieving TVA's objectives to deliver reliable, low-cost, and cleaner energy while reducing environmental impacts. These energy resources from the 2015 IRP included the addition of between 175 and 800 MW (AC) of solar capacity by 2023. In 2017, customer demand prompted TVA to release a Request for Proposal (RFP) for renewable energy resources (2017 Renewable RFP). The PPAs that resulted from this RFP will help TVA meet immediate needs for additional renewable generating capacity in response to customer demands and fulfill the renewable energy goals established in the 2019 IRP. The Proposed Action would provide cost-effective renewable energy consistent with the IRP and TVA goals.

In June 2019, TVA released the final 2019 IRP and the associated EIS (TVA 2019a). This updated IRP provides further direction on how TVA can best deliver clean, reliable and affordable energy in the Valley over the next 20 years, and the associated EIS describes the natural, cultural and socioeconomic impacts associated with the IRP. The 2019 IRP recommends a solar expansion between 1,500 and 8,000 MW by 2028 and up to 14,000 MW by 2038 (TVA 2019a). While the Proposed Action was initiated in accordance with the 2015 IRP, it is consistent with the 2019 IRP.

1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

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

TVA's Proposed Action would result in the construction and operation of the proposed solar facility by Bellefonte Solar, including the actions taken by TVA to construct a new switching station and gen-tie line to connect the solar facility to the existing TVA transmission system. The scope of this EA, therefore, covers both the impacts related to the construction and operation of the proposed Bellefonte Solar Energy Center and impacts related to the associated modifications to the TVA transmission system.

This EA (1) describes the existing environment in the Project Area, (2) analyzes potential environmental impacts associated with the Proposed Action and the No Action Alternative, and (3) identifies and characterizes potential cumulative impacts that could result from the Project in relation to other ongoing or reasonably foreseeable proposed activities within and surrounding the Project Site. The "Project Area" is the potentially affected area within and beyond the Project Site and varies by each resource area as defined in Chapter 3.

Under the PPA, TVA's obligation to purchase renewable power is contingent upon the satisfactory completion of appropriate environmental review and TVA's determination that the Proposed Action will be "environmentally acceptable." To be deemed acceptable, TVA must assess the impacts of the Project on the human environment to determine whether (a) any significant impacts would result from the location, operation, and/or maintenance of the Project and (b) the Project activities would be consistent with the purposes, provisions, and requirements of applicable federal, state, and local environmental laws and regulations.

Based on internal scoping and identification of applicable laws, regulations, executive orders, and policies, TVA identified the following resource areas for analysis within this EA: land use; geology, soils, and prime farmland; water resources; biological resources; visual resources; noise; air quality and greenhouse gases (GHGs); 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, resources potentially impacted, and analyses of these impacts. Additionally, this document includes appendices that contain more detail on technical analyses, supporting information, and correspondences. The organization of the EA is as follows:

- **Chapter 1:** Describes the purpose and need for the Project, the decision to be made, related environmental reviews and consultation requirements, public involvement, necessary permits or licenses, and the EA overview.
- **Chapter 2:** Describes the No Action and Proposed Action Alternatives, provides a comparison of the alternatives, summarizes the proposed mitigation measures covered more fully in Chapter 3, and discusses the Preferred Alternative.
- **Chapter 3:** Discusses the affected environment and the potential direct and indirect impacts on these resource areas. Mitigation measures are also proposed, as appropriate.
- **Chapter 4:** Summarizes unavoidable adverse impacts, the relationship between short-term uses and long-term productivity, and whether the Project makes irreversible and irretrievable commitments of resources. Chapter 4 also discusses the cumulative impacts in relation to other ongoing or reasonably foreseeable proposed activities within the Project Area.
- **Chapters 5 and 6:** Contains the list of EA preparers and the references cited in preparation of this EA, respectively.
- **Appendix A:** TVA Environmental Quality Protection Specifications for Transmission Line Construction
- **Appendix B:** TVA Construction Guidelines near Streams
- **Appendix C:** TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction
- **Appendix D:** Correspondence and Supporting Information
- **Appendix E:** Public Comments

1.3 PUBLIC AND AGENCY INVOLVEMENT

Bellefonte Solar published a notice for the proposed Bellefonte Solar Energy Center in the *Jackson County Sentinel* on June 1 and June 4, 2019.

On January 29, 2020, TVA issued the draft EA for public review and comment. TVA informed the public of the review period via a media advisory, a notice in *Jackson County Sentinel*, and outreach to key stakeholders, government agencies, elected officials, and interested federally-recognized Indian Tribes. TVA posted the draft EA on its webpage (www.tva.gov/nepa) with information about how to submit comments.

During the comment period, TVA received two comments. One comment generally supported the Proposed Action Alternative and the other comment expressed concern about land use impacts and how the solar facility would contribute to winter peaks. All comments along with TVA's response, are included in Appendix E.

1.4 PERMITS AND APPROVALS

1.4.1 Bellefonte Solar

An Alabama Department of Environmental Management (ADEM) General Construction Stormwater National Pollutant Discharge Elimination System (NPDES) permit (State of Alabama Permit Number ALR100000) would be required for the construction of the Project. The process involves completing an ADEM Notice of Intent (NOI) form. If granted, Permit ALR100000 would authorize stormwater discharges associated with construction activities that result in a total land disturbance of one acre or greater, as governed by Section 402 of the Clean Water Act (CWA) (see Section 2.2.2).

In accordance with ADEM requirements, Bellefonte Solar and the construction contractor would develop a site-specific Construction Best Management Practices Plan (CBMPP) and submit it to ADEM. The CBMPP would address all construction-related activities from the date construction commences to the date of termination of permit coverage. The CBMPP would be prepared in accordance with good engineering practices and would be consistent with the requirements and recommendations contained in the *Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas* (Alabama SWCC 2018).

Section 404 of the CWA prohibits the discharge of dredged or fill material into Waters of the U.S. (jurisdictional waters), including wetlands and streams unless authorized by the U.S. Army Corps of Engineers (USACE). CWA Section 404 Nationwide Permits (NWPs) would be required for impacts to jurisdictional waters that are less than 0.5 acre. NWPs are issued by USACE to authorize the construction, expansion, or modification of certain activities that would discharge dredged or fill material into Waters of the U.S., provided the proposed activities meet specific criteria. A pre-construction notification may be required for 0.10 of an acre of impacts depending on the permit requirement.

Section 404 permits require water quality certification (WQC), as set forth in Section 401 of the CWA, prior to discharging fill materials into Waters of the U.S. Section 401 requires any applicant

requesting a federal permit or license for activities that may result in discharges to first obtain a certification from the state that the permitted discharges comply with the state's applicable effluent limitations and water quality standards. In Alabama, ADEM is responsible for the issuance of WQCs, pursuant to the ADEM Administrative Code Chapter 335-6-10 (Water Quality Criteria).

If determined necessary, Bellefonte Solar would obtain a permit for a septic system and follow standard procedures for installing any proposed project water supply wells. Pursuant to Alabama Administrative Code Chapter 420-3-1, the septic permit would involve submitting an Application for Septic Tank/Grease Trap Series Permit (Form CEP-11) and/or a Class V UIC permit (depending on daily volumes) to estimate water use amounts and to provide the proposed location of the septic system in relation to the proposed well and nearby water features such as drainage ways and streams (ADPH 2018). Bellefonte Solar would comply with this permit to appropriately site the septic system with consideration to required setbacks and ADEM direction. Pursuant to the ADEM Administrative Code Chapter 335-9-1, all persons drilling a water well must be licensed and follow standards that ensure groundwater resources are protected. Like septic systems, the licensed well installer must adhere to required setbacks in siting the well. Prior to installing the well, a Notice of Intent (Form 60) would be filed with ADEM to estimate water use amounts and to provide the proposed location of the water well. Bellefonte Solar and its licensed well installer would comply with required setbacks to avoid contamination of the well and prevent runoff from entering the well.

The Alabama Department of Transportation (ALDOT) regulates the installation, adjustment, and relocation of utilities in state highway rights-of-way (ROWs) to ensure the integrity, safety, and functionality of state roadways while accommodating utilities. Per the *ALDOT Utility Manual* (Chapter 4 – Permits and Agreements), a permit is required for additions to or upgrades of existing utility facilities, for installing new utilities on existing ROW, and for changes in voltage or pressure of existing utilities.

Vegetative waste from clearing activities would be burned or chipped and ground. If open burning of debris from tree clearing on the site is planned, the appropriate open burning permits would be obtained from the Alabama Forestry Commission. Information on open or surface burning issued by ADEM would be followed. Only trees and brush from the Project Site would be burned. Weather conditions would be monitored and considered to ensure safety and minimize degradation to air quality during the open burning of any vegetation cleared from the site.

1.4.2 TVA Activities

The proposed Bellefonte Solar 161-kV project substation, TVA's Hollywood 161-kV switching station, gen-tie, and associated access road would be included within the NOI and CBMPP for the Bellefonte Solar NPDES Construction General Permit because these facilities are within the footprint for the proposed solar facility. TVA would obtain an NPDES Construction General Permit from ADEM and develop a CBMPP for proposed OPGW installation along the Hollywood-Scottsboro 161-kV TL, associated access roads, and pole replacements outside of the proposed solar facility footprint. TVA would prepare the required NOI and CBMPP and coordinate with the appropriate state and local authorities. If applicable, TVA would obtain a Section 404 Nationwide or Individual Permit from USACE if project substation, switching station, access road, or gen-tie

line construction activities result in the discharge of dredge or fill into Waters of the U.S. A permit may also be required for burning trees and other combustible materials removed during construction.

CHAPTER 2

2 DESCRIPTION OF THE 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.

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

2.1 NO ACTION ALTERNATIVE

The No Action Alternative provides a baseline of conditions against which the impacts of the Proposed Action Alternative are measured. Under the No Action Alternative, TVA would not purchase the power generated by the Project under the 20-year PPA with Bellefonte Solar (i.e., TVA would not be involved with the Project). If TVA were to select this alternative and Bellefonte Solar elected not to proceed with the project, then Bellefonte Solar would not construct or operate the solar facility. Existing conditions (land use, natural resources, visual resources, physical resources, and socioeconomics) in the Project Area would remain unchanged. TVA would continue to rely on other sources of generation described in the 2019 IRP (TVA 2019a) to ensure an adequate energy supply and to meet its goals for increased renewable energy and low GHG-emitting generation.

2.2 PROPOSED ACTION ALTERNATIVE

Under the Proposed Action Alternative, Bellefonte Solar would construct and operate a 150-MW AC single-axis tracking PV solar facility in Jackson County, Alabama, and TVA would purchase renewable energy from the facility under the 20-year PPA with Bellefonte Solar. The solar facility would generate up to 150-MW AC output for transmission to the TVA transmission network. The Project components would occupy approximately 997 acres of the approximately 1,850-acre Project Site located on 14 individual parcels partially within the incorporated limits of the Town of Hollywood and partially in an unincorporated portion of southern Jackson County, approximately three miles northeast of the City of Scottsboro. The entire 150-MW output of the solar facility would be sold to TVA under the terms of the PPA. The Project would connect to the existing TVA electrical network via the proposed Bellefonte Solar 161-kV project substation, Hollywood 161-kV switching station, and approximately 0.1 mile of new gen-tie line.

This EA assesses (1) the impact of TVA's action to enter into the PPA with Bellefonte Solar, (2) the associated impacts of the construction and operation of the solar facility by Bellefonte Solar, and (3) the interconnection components by TVA.

2.2.1 Project Description

The proposed solar facility and associated TVA interconnection components would occupy approximately 997 acres of an approximate 1,850-acre Project Site (Figure 2-1) that is predominantly flat agricultural land with scattered forested areas. The perimeter of the 997-acre developed portion of the solar facility site, containing blocks of solar panels, inverters, associated

equipment and infrastructure including a new onsite substation, access roads, and electrical cabling, would be enclosed by security fencing. The residual 853 acres of the Project Site would remain undeveloped with no farming or other activities occurring on them outside of mowing/maintenance required for facility operations.

The solar facility would be located within a rural agricultural area, which generally extends east-west between hilly, undeveloped, forested land that extends north-south. Within the 1,850-acre Project Site, several linear forested areas associated with streams and wetlands are situated between agricultural fields. The forested areas within the Project Site total approximately 868 acres (47 percent), while the agricultural fields encompass approximately 982 acres (53 percent). Approximately 197 acres of water features (wetlands, streams, and ponds) are also present on the Project Site.

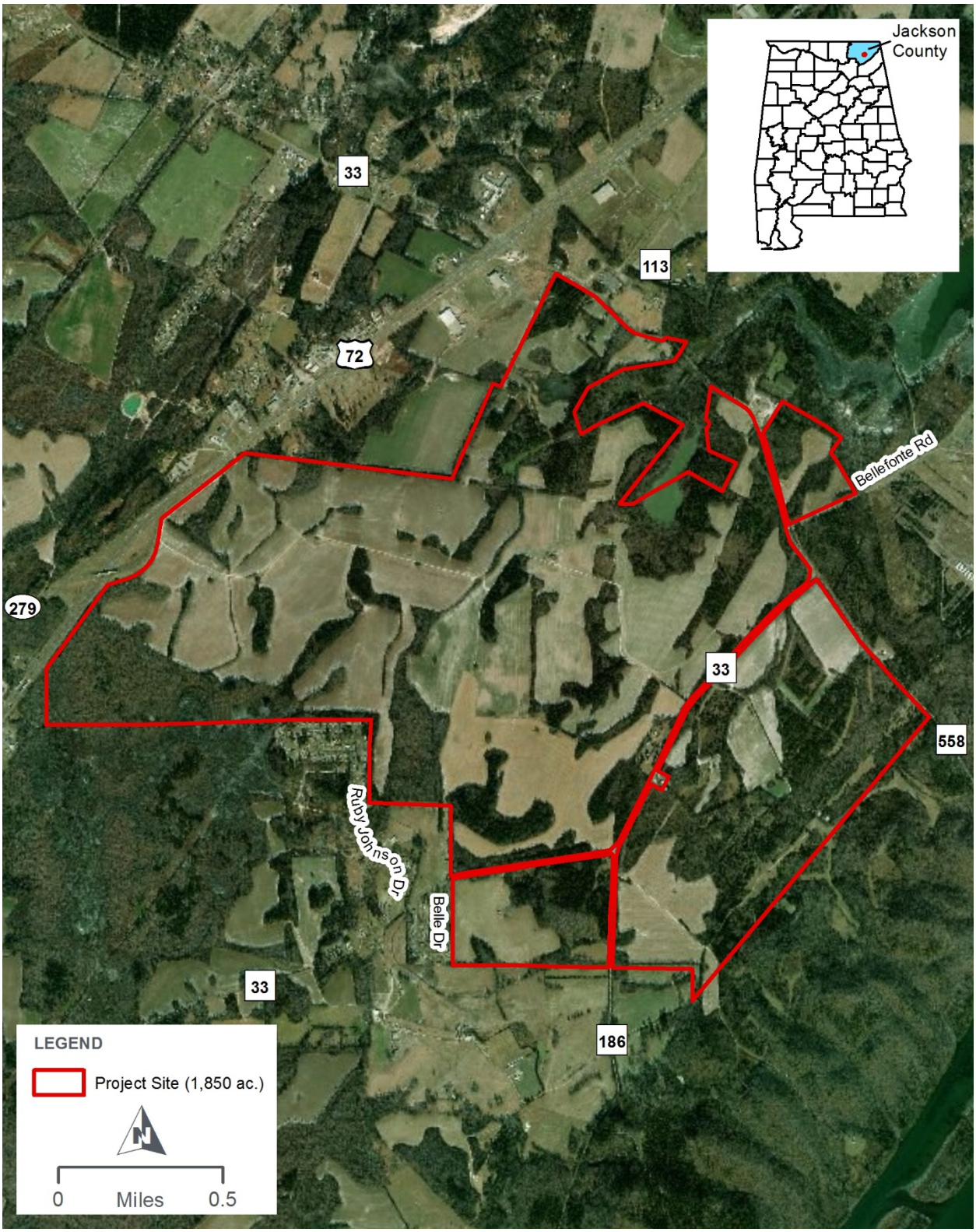

Figure 2-1. Aerial photo showing the Bellefonte Solar Energy Center 1,850-acre Project Site

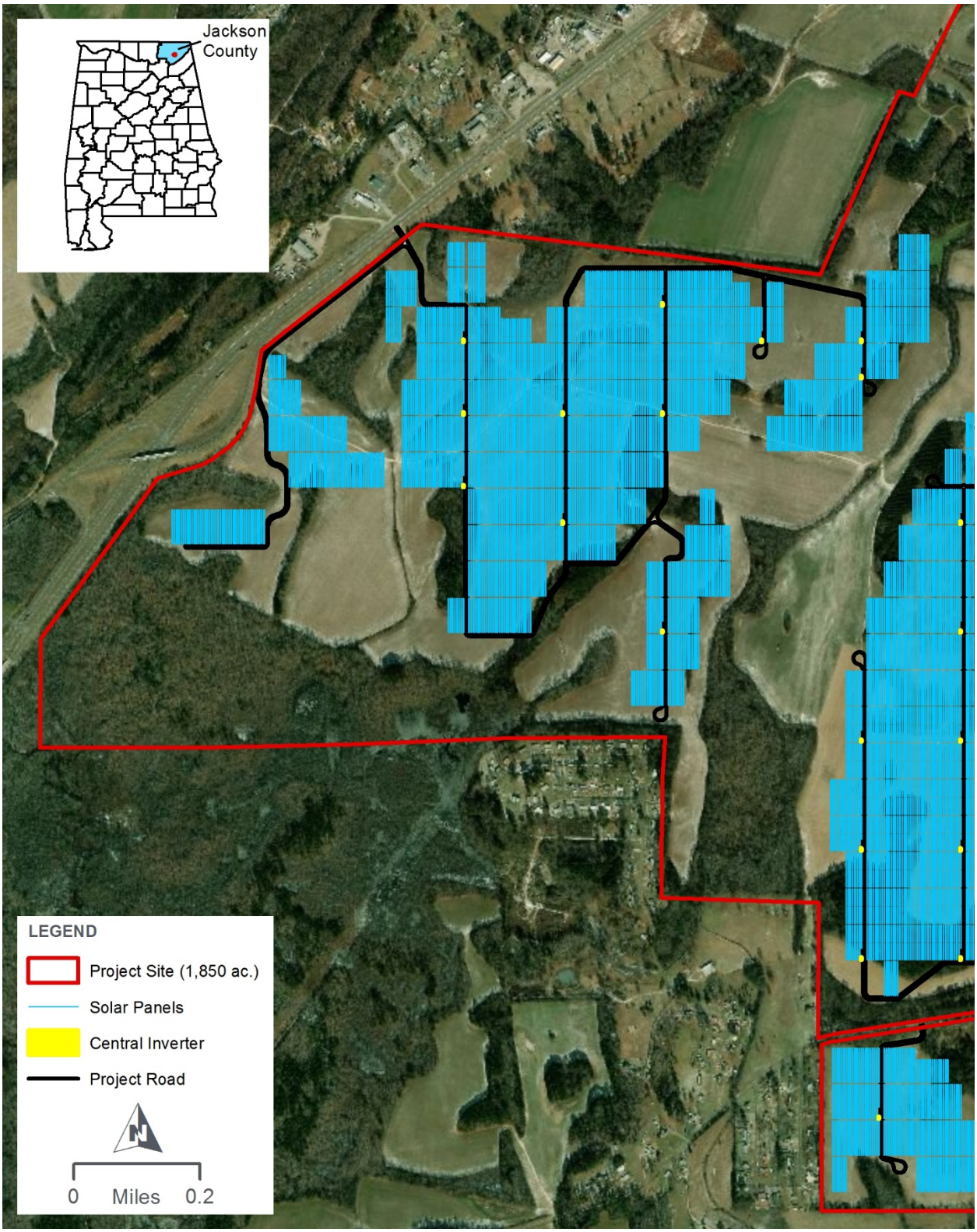

Figure 2-2. Aerial photo showing the proposed layout of the Bellefonte Solar Energy Center components (West)

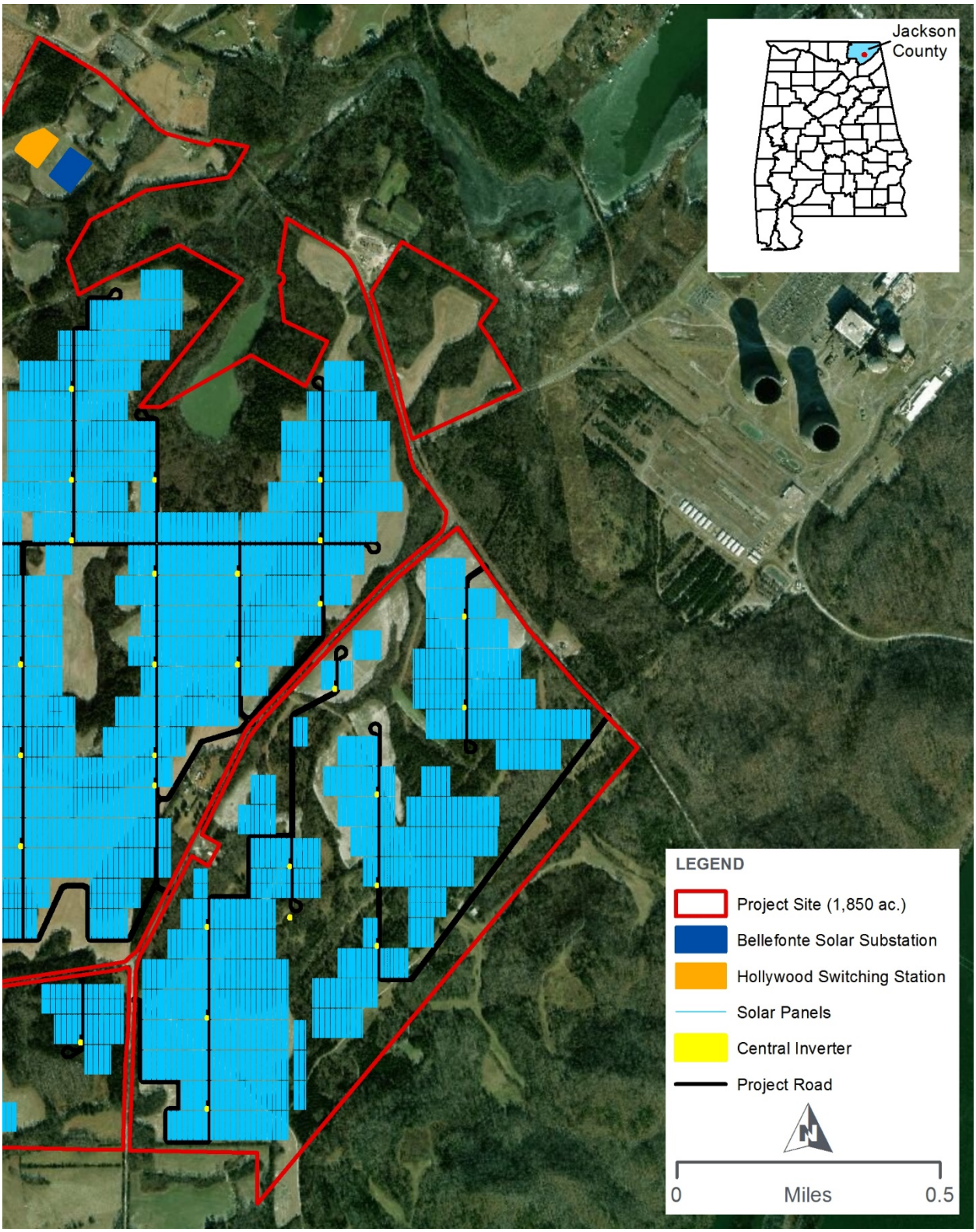

Figure 2-3. Aerial photo showing the proposed layout of the Bellefonte Solar Energy Center components (East)

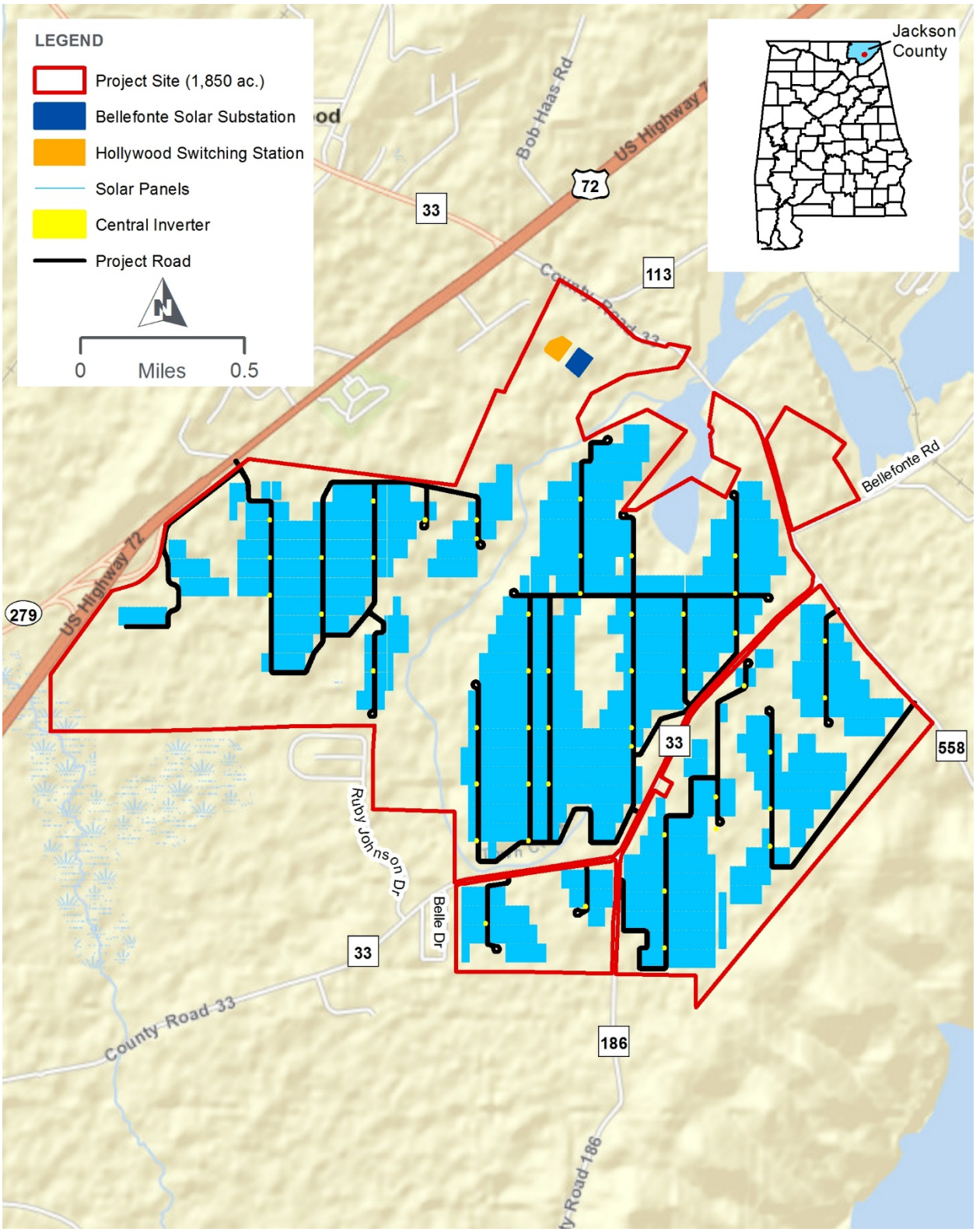

Figure 2-4. Street map showing the proposed layout of the Bellefonte Solar Energy Center components

The solar facility would convert sunlight into DC electrical energy within PV panels (modules) (Figure 2-5). PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current is produced, which can be used as electricity (TVA 2014).

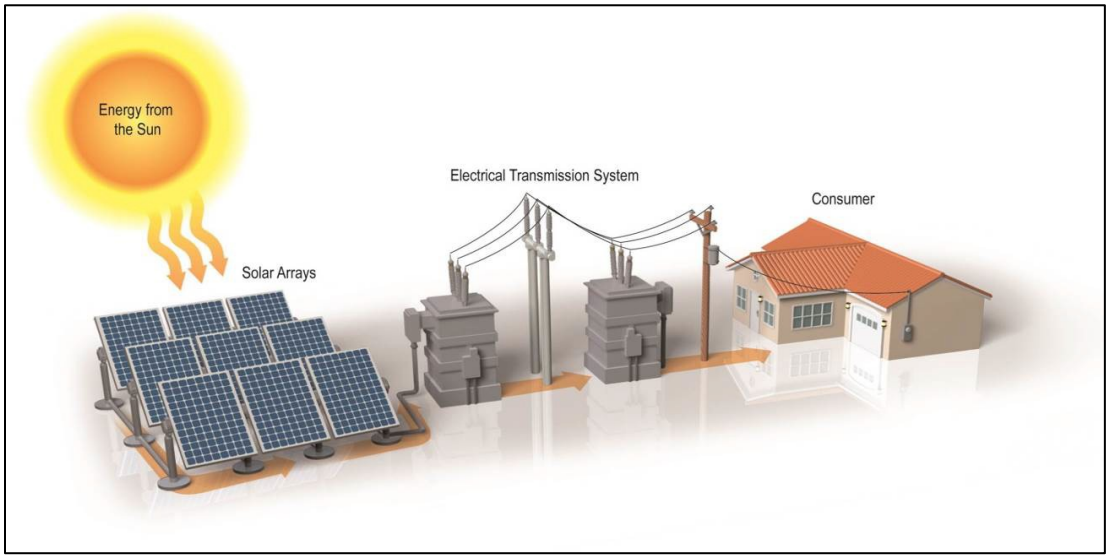

Figure 2-5. **General energy flow diagram of PV solar system (not to scale).**

The Project would be composed of PV modules mounted together in arrays. Groups of panels would be connected electrically in series to form "strings" of panels, with the maximum string size chosen to ensure that the maximum inverter input voltage is not exceeded by the string voltage at the Project's high design temperature. The panels, approximately 6.5 feet by 3.5 feet, would be located in individual blocks consisting of the PV arrays and an inverter station on a concrete pad or steel piles, to convert the DC electricity generated by the solar panels into AC electricity. Inverter block areas would be enclosed by chain-link security fencing. The portions of the Project Site outside the fenced-in areas would not be developed.

The modules would be attached to single-axis trackers. The axis trackers would likely be attached to driven steel pile foundations and would be designed to pivot the panels along their north-south axes to follow the path of the sun from the east to the west across the sky (Figure 2-6).

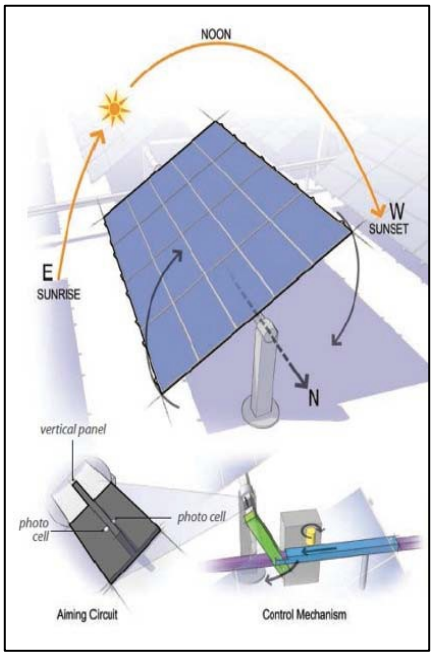

Figure 2-6. Diagram of single-axis tracking system (not to scale)

Collections of strings of panels would be connected by either underground or aboveground DC cabling to a central inverter, which would convert DC electricity from PV panels into AC so that the energy could be transmitted

to the electrical grid. The inverter specifications would fully comply with the applicable requirements of the National Electrical Code and Institute of Electrical and Electronics Engineers standards. Each inverter would be collocated with a mid-voltage transformer (MVT), which would step-up the AC voltage to 34.5-kV in order to minimize the AC cabling electrical losses between the central inverters and the onsite substation. Underground AC power cables would connect all of the MVTs to the MPT, located within the proposed onsite Bellefonte Solar 161-kV project substation, via approximately 0.1 mile of new gen-tie line which is discussed in more detail in Section 2.2.5.

Other Project components may include security equipment, access roads, communications/Supervisory Control and Data Acquisition equipment, and meteorological stations. Also, if determined necessary, the Project may include an operations and maintenance building and supporting Project water service components, which could include water wells, a septic system, or a pump-out septic holding tank. Compacted gravel access roads would provide access to each inverter block for maintenance and repairs and to the onsite substation and potential operations and maintenance building. Figure 2-2, Figure 2-3, and Figure 2-4 show the solar facility with major proposed Project elements.

2.2.2 Solar Facility Construction

Site preparation is generally required prior to construction of the solar facility and assembly of the solar arrays. Site preparation typically includes: surveying and staking, removal of tall vegetation/small trees, light grading/clearing, installation of security fencing around components near one another and not separated by public roads, erosion prevention and sediment control best management practices (BMPs), and preparation of construction laydown areas. Solar array assembly and construction includes driving steel piles for the tracker support structures, installation of solar panels, and electrical connections and testing/verification.

Bellefonte Solar would 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 consistent slope to the local land. Prior to any major grading, efforts would be made to preserve native topsoil, which would be removed from the area to be graded and stockpiled onsite for redistribution over the disturbed area after the grading is completed. Silt fence, sediment traps, 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 after construction using a mixture of certified weed-free, low-growing, native and/or noninvasive grass and herbaceous plant seed obtained from a reputable seed dealer. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is stable. Water would be used for soil compaction and dust control as-needed during construction.

Grading would consist of the excavation, redistribution, 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. Bellefonte Solar would take efforts to ensure grading at the site results in a net zero

balanced cut and fill quantity of earthwork to the extent practical and therefore not require offsite or onsite hauling. However, some minimal offsite or onsite hauling may be necessary. The 997 acres proposed for development of the Bellefonte Solar Energy Center would be cleared of tall vegetation to prevent shading of the solar panels and graded for construction and placement of the solar panels, gravel access roads, Project substation, accompanying electrical components, and if determined necessary, an operations and maintenance building. Open burning or chipping and grinding of debris from the tree clearing on the site would occur to minimize construction wastes. If burning is implemented, only trees and brush would be burned; burning of other construction debris is not anticipated.

In accordance with TVA and ADEM requirements, minimum 50-foot buffers surrounding jurisdictional perennial and intermittent streams and wetlands would be established as an avoidance measure prior to any clearing, grubbing, grading, or boring activities conducted by the construction contractor. Buffers are not required on ephemeral streams. Apart from removal of tall vegetation through non-mechanical means and leaving the roots in place, these buffered areas would be avoided during construction to the greatest extent practicable. Once the buffered areas are marked, construction areas would be cleared and mowed of vegetation and miscellaneous debris. Mowing would continue as needed to contain growth during construction.

To manage stormwater during construction, onsite temporary sedimentation basins, sediment traps, or diversion berms would be constructed within the 997-acre disturbed area of the Project Site. If needed, a diversion berm would be constructed along portions of the Project Site perimeter to contain stormwater onsite. Any necessary sedimentation basins and traps would be compliant with ADEM requirements. If necessary, sedimentation basins and traps would be constructed either by impoundment of natural depressions or by excavating the existing soil. The floor and embankments of the basins would be allowed to naturally reestablish native vegetation after construction (or replanted as necessary) to provide natural stabilization and minimize subsequent erosion. All buffered streams and wetlands would be protected by erosion control silt fence. Sediment traps would be placed in strategic drainage areas to prevent sediment from entering onsite streams and wetlands. Offsite sediment migration would be minimized by the placement of silt fence around each area of ground disturbance within the Project Site. These stormwater BMPs would prevent sediment from entering onsite streams and wetlands and prevent sediment migration offsite during construction prior to achievement of final vegetative stabilization.

Approximately 20 acres of the Project Site would be used as construction assembly areas (also called laydown areas) for worker assembly, safety briefings, vehicle parking, and material storage during construction. Some of these areas would be staged within the locations proposed for the PV arrays. The laydown areas would be onsite for the duration of construction. Temporary construction trailers for material storage and office space would be parked onsite. Following completion of construction activities, trailers, unused materials, and construction debris would be removed from the Project Site.

Construction activities would be sequenced to minimize the time that bare soil in disturbed areas is exposed. In addition to the silt fencing described above, 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 road shoulders, construction office and laydown areas, ditches, and other Project-specific locations, would be seeded post-construction. If conditions require, soil may be further stabilized by mulch or sprayable fiber mat. If the area seeded is a steep slope (6:1 or greater), hydroseeding may be employed as an alternative measure. Where required, hay mulch would be applied at three tons per acre and well distributed over the area. Erosion control measures would be inspected and maintained until vegetation in the disturbed areas has returned to the preconstruction conditions or the site is stable. As part of NPDES permit authorization (see Section 1.4), the site-specific CBMPP would be finalized with the final grading and civil design and would address all construction-related activities prior to construction commencement.

The design of the tracker support structures could vary depending on the final PV technology and vendor selected. Based on preliminary geotechnical survey results for the Project Site, the trackers would likely be attached to driven steel pile foundations. The steel pile foundations are typically galvanized and used where high load bearing capacities are required. The pile is driven with a hydraulic ram. Soil disturbance is restricted to the pile insertion location to a depth typically less than 20-feet below grade; there is also potential for temporary soil disturbance from the hydraulic ram machinery, which is about the size of a small tractor. The tracker design and pile foundation design would be sealed by a registered Professional Engineer and Structural Engineer, respectively. Screw piles are another option for PV foundations which are drilled into the ground with a truck-mounted auger. Screw piles create a similar soil disturbance footprint as driven piles.

Solar panels would be manufactured offsite and shipped to the Project Site ready for installation. All final electrical collection cables would be underground, and electricians and assistants would run the electrical cabling throughout the solar facility. The trenches to hold the cabling would be approximately 3- to 4-feet deep and 2- to 12-inches wide. The trenches would be backfilled with native soil and appropriately compacted.

The MPT would be supported on a concrete foundation. An aboveground transmission cable would be constructed to connect the MPT through a circuit breaker.

After the equipment is electrically connected, electrical service would be tested, motors would be checked, and control logic would be verified. As the solar arrays are installed, the balance of the facility would continue to be constructed and installed, and the instrumentation would be installed. Following the testing of all of the individual systems, integrated testing of the Project would occur. Electrical interconnection details are provided in Section 2.2.5 below.

Security fencing would be placed around the perimeter of Project elements near one another during construction and for the duration of the Project operation, using 7-foot-tall fencing consisting of 6-foot tall chain-link fencing topped with three strands of barbed wire. Access to the solar facility would be provided by double-swing gates and twenty (20) foot wide access roads. The Project Site would be accessible only to TVA, Bellefonte Solar, and their agents and contractors.

Construction activities would take approximately 20 months to complete using a crew that ranges from 150 to 500 workers. Work would generally occur seven days a week during daylight hours. Additional hours after dark could be necessary to make up schedule deficiencies or to complete critical construction activities. Night-time construction, if determined necessary, would require lighting in some areas of the Project Site. Any additional night-time lighting would be downward-facing and timer- and/or motion-activated to minimize impacts to wildlife and any surrounding receptors, including nearby households.

2.2.3 Solar Facility Operations

During operation of the solar facility, no major physical disturbance would occur. Moving parts of the solar facility would be restricted to the east-to-west tracking motion of the solar modules, which amounts to a movement of less than a one degree angle every few minutes. This movement is barely perceptible. In the late afternoon, module rotation would start to move from west-to-east in a similar slow motion to minimize row-to-row shading. At sunset, the modules would track to a flat or angled stow position. Otherwise, the PV modules would simply collect solar energy and transmit it to the TVA power grid. With the exception of fence repair, vegetation control, and periodic array inspection, repairs, and maintenance, the solar facility would have relatively little human activity during operation. Water service, sewer service, septic service, and permanent lighting are anticipated as potential onsite needs during facility operations, independent of the potential operations and maintenance building. Permanent lighting would be downward-facing and timer- and/or motion-activated to minimize impacts to surrounding areas.

During operation, the Bellefonte Solar Energy Center would require up to six full-time staff to manage the facility and conduct regular inspections. Inspections would include identifying any physical damage of panels, wiring, central inverters, transformers, and interconnection equipment, and drawing transformer oil samples. Vegetation on developed portions of the Project Site would be maintained to control growth and prevent overshadowing or shading of the PV panels. Trimming and mowing would likely be performed several times per year, depending on growth rate, to maintain an appropriate ground cover height of no more than approximately 12 to 18 inches. During operation of the solar facility, selective use of U.S. Environmental Protection Agency (USEPA)-approved spot herbicides may also be employed around structures to control invasive weeds. Grazing sheep may also be used for controlling vegetation on the Project Site. The security fence around the Project Site perimeter would keep the sheep inside the designated area if this option is selected.

Precipitation in the region is typically adequate to remove dust and other debris from the PV panels while maintaining acceptable energy production; therefore, manual panel washing is not anticipated unless a site-specific issue is identified. If later identified, module washing would occur no more than twice a year and would comply with proper BMPs and Construction Best Management Practices Plan (CBMPP) to prevent soil erosion and/or stream and wetland sedimentation.

In addition to full-time staff, the proposed solar facility would be monitored remotely from the NextEra Energy Juno Beach, Florida operational headquarters 24 hours a day, seven days a week to identify security or operational issues. In the event a problem is discovered during

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

2.2.4 Decommissioning and Reclamation

The Project would operate and sell power to TVA under the terms of the PPA for the first 20 years of its life. At the end of the term of the PPA, Bellefonte Solar would assess whether to cease operations at the solar facility or to replace equipment and attempt to enter into a new power purchase agreement or make some other arrangement to sell the power. If operations were ceased, the facility would be decommissioned and dismantled, and the Project Site would be restored. In general, the majority of decommissioned equipment and materials would be recycled. Materials that could not be recycled would be disposed of at an approved facility. As the lease agreement with the landowner is for 40 years, site control would be maintained for longer than the 20-year PPA period, and Bellefonte Solar may attempt to renegotiate further PPA terms with TVA. At the end of the 20-year contract period, TVA may also choose to purchase and operate the facility. If additional PPA terms are arranged or if TVA chooses to operate the facility, these activities would be evaluated through separate NEPA processes.

2.2.5 TVA Electrical Interconnection

Under the Proposed Action, Bellefonte Solar would construct the Bellefonte Solar 161-kV project substation (Project Substation) and TVA would construct the Hollywood 161-kV Switching Station (Hollywood Switching Station) adjacent to structure 272 of the L5032 Bellefonte Nuclear Plant (NP)-Scottsboro 161-kV TL, resulting in a 0.1-mile gen-tie line. The Project Substation would be located on the immediate east side of the existing TL while the Hollywood Switching Station would be located on the immediate west side of the existing TL. L5032 would be renamed the Hollywood-Scottsboro 161 kV TL. From the new Hollywood Switching Station to the Scottsboro 161-kV Switching Station (approximately 5.3 miles), the existing high-strength steel ground wire would be replaced by new OPGW. One new switch would be installed at the existing loop into Bellefonte NP location on the L5718 Widows Creek Fossil Plant (FP)-Bellefonte NP 161-kV TL. The existing Bellefonte NP Loop would be converted into a double tap (one normally sourced and the other normally isolated) on the new Widows Creek FP-Hollywood 161-kV TL. Some structures would be renumbered to eliminate duplicate structure numbers and to revise line numbers between Bellefonte NP and the Hollywood Switching Station. At Bellefonte NP, Service Line A (Bay 1) and Service Line B (Bay 4) would be tied together outside the 161-kV Yard. Both service lines would have one new switch for sectionalizing purposes.

The expected duration of the OPGW replacement work would be approximately four months, while construction of the Project Substation and Hollywood Switching Station would take approximately 12 months. The construction period would overlap with construction of the Bellefonte Solar Energy Center and associated interconnection components. Up to approximately 50 workers would be involved in construction.

2.2.5.1 TVA Transmission Best Management Practices

TVA utilizes standard practices for transmission and interconnection-related construction activities. These guidance and specification documents are taken into account when considering the effects of the Proposed Action and include:

- *TVA Environmental Quality Protection Specifications for Transmission Line Construction*,
- *TVA Transmission Construction Guidelines Near Streams*,
- *TVA Environmental Quality Protection Specifications for Transmission Substation or Communications Construction*, and
- *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Revision 3 – 2017* (2017b).

All of these documents are available on TVA's transmission system projects web page (TVA 2019b), and all but the final, more lengthy document are provided herein as appendices (Appendix A, Appendix B, and Appendix C). TVA transmission projects also utilize BMPs to provide guidance for clearing and construction activities.

2.2.5.2 Switching Station Construction

TVA proposes to construct the Hollywood 161-kV Switching Station encompassing approximately two acres adjacent to structure 272 on the immediate west side of the L5032 Bellefonte NP-Scottsboro 161-kV TL. Three 161-kV breakers would be installed in a ring bus configuration along with associated metering, communication, and protective equipment. TVA would also install a switch house.

TVA would clear vegetation on the Hollywood Switching Station site, remove the topsoil, and grade the property in accordance with TVA's *Site Clearing and Grading Specifications* (TVA 2017a). Limited clearing would occur, as the site is predominantly cropland. In areas where there is a need to clear trees, equipment used could include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. As necessary, any woody debris and other vegetation would likely be piled and burned, chipped, or taken offsite. Prior to burning, TVA would obtain any necessary permits. In some instances, vegetation may be windrowed along the edge of the Project Site to serve as sediment barriers. Further guidance for clearing and construction activities can be found in Appendix A, Appendix B, Appendix C, and TVA's BMP manual (TVA 2019b).

2.2.5.3 Structures for Fiber Installation

The existing Bellefonte NP-Scottsboro 161-kV TL currently utilizes steel tower structures. The following structural activities would be completed in order to support the new OPGW, Hollywood Switching Station, and Project Station: structure 271 A2 would be renumbered to structure 272 A2; structure 272 would be retired/removed; switch structure 271 A would be relocated to the north and renumbered to structure 272 A; and, thirteen new structures would be constructed as either 1-, 2-, or 3-pole, steel pole structures. The maximum height of all affected structures is 70 feet. Examples of the existing and proposed structures are shown in Photo 2.2-1 and Photo 2.2-2.

Table 2-1. Pole Structures on the Hollywood-Scottsboro TL.

Structure Number	Structure Type	Structure Height (feet)
1	HS-5G	Maximum of 70
267 A	HS-5AG	Maximum of 70
267 B	HS-5G	Maximum of 70
267 C	SS1 35	Maximum of 70
267 D	HS-5G	Maximum of 70
267 E	HS-5AG	Maximum of 70
272 A2 (formerly 271 A2)	Inline DE	Maximum of 70
272 A (formerly 271 A)	SSFT	Maximum of 70
270	S-5G	Maximum of 70
271	HS-5G	Maximum of 70
272	H1-230	Maximum of 70
273	H1-230	Maximum of 70
274	HS-5G	Maximum of 70
275	S-5G	Maximum of 70

Photo 2.2-1. Existing steel tower and switch structures

Photo 2.2-2. Proposed steel pole structure

Three conductors (the cables that carry the electrical current) are required to make up a single circuit in alternating current TLs. For a 161-kV TL, each single-cable conductor is attached to

porcelain insulators that are either suspended from the structure cross arms or attached directly to the structure. A smaller overhead ground wire or wires are attached to the top of the structures.

Poles at angles (angle points) in the TL may require supporting screw-, rock-, or log-anchored guys. 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, depending on local soil conditions.

Equipment used during the construction phase would include trucks, truck-mounted augers, drills, and excavators, 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 per TVA BMPs. TVA's proposed work along the existing TL would require minimal tree clearing and is expected to be limited to small trees and limb trimming along existing TL and around some of the new structures that would be constructed.

2.2.5.4 Access Roads

Access roads would be needed to allow vehicular access to each pole structure and other points along the existing ROW associated with the Bellefonte NP-Scottsboro 161-kV TL. Typically, new permanent or temporary access roads used for TLs are located on the ROW wherever possible and are designed and located to avoid severe slope conditions and to minimize impacts to environmental resources such as streams. Access roads are typically about 12- to 16-feet wide and are surfaced with dirt, mulch, or gravel. TVA's proposed work along the access roads would require minimal tree clearing and is expected to be limited to small trees and limb trimming along existing access roads. The construction entrance and exit for the Bellefonte Solar 161-kV Project Substation would be off of County Road (CR) 33 at the intersection with CR 113. This location would also serve as a permanent access point during operation of the Project.

With the appropriate permits as described in Section 1.4.2, culverts and other drainage devices, fences, and gates would be installed as necessary. Culverts installed in any perennial streams would be removed following construction. However, in ephemeral streams, the culverts would be left or removed, depending on the desires of the landowners or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access roads to previous conditions. Refer to Section 2.5 for BMPs and mitigation measures that would be taken to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed access roads. Additional applicable environmental quality protection specifications are provided in Appendix A, Appendix B, and Appendix C.

2.2.5.5 Construction Assembly Areas

A construction assembly area, or "laydown area," would be required for worker assembly, vehicle parking, and material storage. The proposed laydown area would be shared with the construction of the solar facility. No additional disturbance or vegetation removal beyond what has been described for the solar facility would be associated with the laydown yard for the TVA electrical interconnection. Trailers used during the construction process for material storage and office

space could be parked at these locations. Following completion of construction activities, all trailers, unused materials, and construction debris would be removed.

2.2.5.6 Conductor and Fiber Installation

TVA line work from a helicopter would be performed by a lineman sitting on a bench outside of the helicopter who visits each structure in order to unclip the overhead ground wire (OHGW) and install a pulley at each structure. Upon completion of that task, equipment would be set up at predetermined points along the transmission line based on the length of the reel of new optical ground wire (OPGW). The old OHGW would be removed while rope is pulled in through the pulleys that were previously installed. The rope would then be used to pull the new OPGW cable on to the structures. Upon completion of pulling the new OPGW cable to all the structures, the helicopter lineman would revisit each structure and clip the OPGW back on to the structure and remove the pulley. Reels of fiber vary in length from 10,000 to 15,000 feet. One reel of OPGW cable can be installed using this method approximately every two working days in ideal conditions.

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 (TVA 2019a) and providing up to 150-MW AC output for transmission to the electrical network, multiple factors were considered. The process of screening potential locations and ultimately eliminating those sites that did not have the needed attributes ultimately led to the consideration of the Project Site.

The site screening process consisted of general solar resource screening within TVA's service area and the availability of nearby electric infrastructure for interconnection to TVA's system with sufficient available transmission capacity for the proposed solar facility. Additional site screening consisted of identifying 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 onsite infrastructure or existing tall infrastructure in the immediate vicinity;
- Land having sound geology for construction suitability, with minimal and/or avoidable floodplains or large forested or wetland areas;
- Large contiguous parcels of land with between 750–900 acres available for solar panel installation and additional surrounding acreage for attendant infrastructure and site buffering;
- Parcels of land with appropriate local zoning regulations and located away from densely populated areas; and
- Land that would allow the parties to avoid and/or minimize impacts to known sensitive biological, visual, and cultural resources.

As a result of this screening process, two potential project sites were selected: the current Project Site near Bellefonte and another site near Widows Creek, Jackson County, Alabama. Based on

additional desktop and field reviews, the Widows Creek site was eliminated from further consideration due to the presence of sensitive receptor visual resources, the potential for impacts to federally and state-listed endangered and threatened species, and substantial impacts to wetlands and streams. Consequently, selection of the Widows Creek site would likely have resulted in greater environmental impacts and higher development costs, including mitigation costs, than the Project Site.

2.4 COMPARISON OF ALTERNATIVES

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

Table 2-2. Comparison of impacts by alternative

Resource area	Impacts from the No Action Alternative	Impacts from the Proposed Action Alternative
Land Use	No direct or indirect impacts anticipated.	Minor direct adverse impacts on land use due to change from agricultural to solar; however, solar power is considered a special exception land use in this portion of Jackson County. No indirect effects on land use.
Geology, Soils, and Prime Farmlands	No direct or indirect impacts anticipated.	Geology: Minor direct impacts to potential subsurface geological resources. Soils: Minor direct impacts resulting from minor to minimal increases in erosion and sedimentation during construction and operation. While in operation, adverse impacts to soils would be partially offset by beneficial effects to soil health with the use of native and/or noninvasive vegetation. Farmlands: Direct adverse impacts from removal of 421 acres of prime farmland from potential agricultural use for the duration of the Project.
Water Resources	No direct or indirect impacts anticipated.	Groundwater: No direct adverse impacts anticipated; minor beneficial indirect impacts to groundwater due to reduction in fertilizer and pesticide use and planting of vegetation. Surface water: Minor beneficial indirect impacts to surface water due to reduction in fertilizer and pesticide use compared with current agricultural use. Minor direct impacts to one wetland (0.05 acre) due to construction of the Hollywood Switching Station. The use of BMPs would minimize impacts to the wetland. No direct impacts to streams. Floodplains: No direct or indirect impacts are anticipated as the transmission facilities and solar panels would not be located in the floodplains of Dry Creek and Town Creek.

Resource area	Impacts from the No Action Alternative	Impacts from the Proposed Action Alternative
Biological Resources	No direct or indirect impacts anticipated.	Vegetation: Minor direct impacts to vegetation by clearing of up to 434 acres of trees and other tall vegetation within the 997-acre portion of the Project Site proposed for development and some small trees and limb trimming along existing access roads associated with the existing Hollywood-Scottsboro 161 kV TL. Minor impacts to cedar glade habitat will occur with the installation of fencing during construction to exclude vehicles and construction equipment from the main portion of the habitat. Wildlife: Minor impacts to wildlife due to changes to habitat; direct and indirect effects on common migratory birds and mammal species; with seasonal restrictions on work within 660 feet of osprey nests and heron colonies, and seasonal restrictions on the majority of the forest to be cleared (392 acres to be cleared in winter months) the Project is not anticipated to significantly affect migratory bird species of concern; minor impacts to common wildlife species due to the existence of Project components and increased human presence. Rare, Threatened, and Endangered Species: With seasonal restrictions on suitable bat tree removal and use of BMPs, the Project is not likely to significantly affect federal or state-listed species. Long-term minor impacts to state-listed species will occur, however, with the installation of temporary fencing during construction to exclude vehicles and construction equipment from the main portion of the habitat, impacts are minimized.
Visual Resources	No direct or indirect impacts anticipated.	Temporary, minor impacts on visual resources due to altering the visual character and increased activity during the construction phase. During operations, minor to moderate adverse direct impacts in the immediate vicinity due to presence of PV panels; however, impacts will be mitigated via substantial tree buffers around the solar facility.
Noise	No direct or indirect impacts anticipated.	Temporary, minor adverse impacts would occur during construction; minimal to negligible impacts during operation and maintenance.
Air Quality and Greenhouse Gas Emissions	No direct or indirect impacts anticipated.	Air quality: Minor direct impacts to air quality would be anticipated as a result of construction of the Project; no negative impacts to air quality as a result of operation of the Project. GHGs: Temporary impacts to GHG emissions expected during construction would be negligible; beneficial effects would also occur, due to the nearly emissions-free power generated by the solar facility, offsetting power that would otherwise be generated by the combustion of fossil fuels.

Resource area	Impacts from the No Action Alternative	Impacts from the Proposed Action Alternative
Cultural Resources	No direct or indirect impacts anticipated.	Archaeological Resources: Impacts on three NRHP-eligible archaeological sites. Pursuant to 36 CFR Part 800.6(c), TVA is developing a MOA in consultation with the Alabama SHPO to minimize and/or mitigate the effects of 1JA1243, 1JA1254, and 1JA1256. Mitigation would include data recovery and a public outreach component. TVA also notified the Advisory Council on Historic Preservation of the adverse effect finding.
Utilities	No direct or indirect impacts anticipated.	Potential short-term adverse impacts to local utilities (electricity, telecommunication connections) when bringing the solar facility on-line or during routine maintenance of the facility; no long-term adverse impacts are anticipated. Long-term beneficial impact to electrical services across the region.
Waste Management	No direct or indirect impacts anticipated.	No adverse effects to waste management are anticipated with the use of BMPs.
Public and Occupational Health and Safety	No direct or indirect impacts anticipated.	Minor, temporary adverse impacts during construction. No public health or safety hazards would be anticipated as a result of operation.
Transportation	No direct or indirect impacts anticipated.	Direct impacts to transportation during construction would be anticipated to be minor to moderate and minimized or mitigated. Minimal direct impacts to transportation during operation; no indirect impacts to transportation.
Socioeconomics	No direct or indirect impacts anticipated.	Short-term beneficial economic impacts would result from construction, including the purchase of materials, equipment, and services and a temporary increase in employment, income, and population. Positive, long-term, direct impacts to economics and population from Project operation. The local tax base would increase from construction of the solar facility and would be beneficial to Jackson County and the vicinity.
Environmental Justice	No direct or indirect impacts anticipated.	No disproportionately high or adverse direct or indirect impacts on minority or low-income populations.

2.5 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Bellefonte Solar would implement minimization and mitigation measures in relation to resources potentially affected by the Project. These would be developed with consideration to BMPs, permit requirements, and adherence to the CBMPP.

In association with the proposed electrical interconnection, TVA would employ standard practices and specific routine measures to avoid and minimize impacts to resources. These practices and measures are summarized in this section.

2.5.1 Bellefonte Solar Energy Center

Bellefonte Solar would implement the following minimization and mitigation measures to reduce impacts to the following resources:

- Land use and visual resources
    - Install anti-reflective, PV panel surfaces to minimize or eliminate negative visual impacts such as glare and reflection.
- Geology and soils
    - Install silt fence along the perimeter of vegetation-cleared areas;
    - Implement other soil stabilization and vegetation management measures to reduce the potential for soil erosion during site operations;
    - Make an effort to balance cut-and-fill quantities to alleviate the transportation of soils offsite during construction; and
    - Avoid known sinkhole.
- Water resources
    - Comply with the terms of the CBMPP prepared as part of the NPDES permitting process;
    - Use BMPs for controlling soil erosion and runoff, such as the use of 50-foot buffer zones surrounding perennial and intermittent streams and wetlands and the installation of erosion control silt fences and sediment traps;
    - Implement other routine BMPs as necessary, such as non-mechanical tree removal within surface water buffers, placement of silt fence and sediment traps along buffer edges, selective herbicide treatment to restrict application near receiving water features, and proper vehicle maintenance to reduce the potential for adverse impacts to groundwater; and
    - Review temporary stormwater basins and construction assembly and laydown areas when those locations are known.
- Biological resources
    - Revegetate with native and/or noninvasive vegetation to reintroduce habitat, reduce erosion, and limit the spread of invasive species;
    - Consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA was conducted and concurrence was received on January 30, 2020. NextEra will also consider USFWS recommendations regarding biological resources and pollinator species;

  - Use of timer- and/or motion-activated downward facing lighting to limit attracting wildlife, particularly migratory birds and bats;
  - Instruct personnel on wildlife resource protection measures, including applicable federal and state laws such as those that prohibit animal disturbance, collection, or removal, the importance of protecting wildlife resources, and avoiding plant disturbance;
  - Avoid direct impacts to many migratory birds and all federally listed tree roosting bats by clearing trees and shrubs in winter months outside of nesting season and summer roosting season, respectively;
  - Coordinate with U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) if construction activities may occur within 660 feet of active osprey nests;
  - Implement Avian Power Line Interaction Committee (APLIC) guidelines, as described in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012) to minimize impacts to birds; and
  - Install temporary fencing during construction to exclude vehicles and construction equipment from the main portion of the delineated cedar glade habitat. Post-construction, this portion of the habitat would remain undeveloped to protect the plant communities present.
- Waste Management
  - Develop and implement a variety of plans and programs to ensure safe handling, storage, and use of hazardous materials.
- Public and Occupational Health and Safety
  - Use BMPs for site safety management to minimize potential risks to workers.
- Transportation
  - Implement staggered work shifts and a flag person during the heavy commute periods to manage traffic flow near the Project Site.
- Noise
  - Limit construction activities primarily to daytime hours; and
  - Ensure that heavy equipment, machinery, and vehicles utilized at the Project Site meet all federal, state, and local noise requirements.
- Air Quality and GHG Emissions
  - Comply with local ordinances or burn permits if burning of vegetative debris is required; and
  - Use BMPs such as periodic watering, covering open-body trucks, and establishing a speed limit to mitigate fugitive dust.
- Cultural Resources
  - Pursuant to 36 CFR Part 800.6(c), TVA is developing a Memorandum of Agreement (MOA) in consultation with the Alabama State Historic Preservation Officer (SHPO) to minimize and/or mitigate the effects of 1JA1243, 1JA1254, and 1JA1256. Mitigation would include data recovery and a public outreach component. TVA also notified the Advisory Council on Historic Preservation of the adverse effect finding.

2.5.2 TVA Electrical Interconnection

TVA employs standard practices when constructing, operating, and maintaining transmission lines, structures, and the associated ROW and access roads. These can be found on TVA's transmission website (TVA 2019b). Some of the more specific routine measures that would be taken to reduce the potential for adverse environmental effects during the construction, operation, and maintenance of the proposed transmission line and access roads are as follows:

- TVA would utilize standard BMPs, as described in *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities – Revision 3*, TVA's BMP manual (TVA 2017b), and the *Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas* (Alabama SWCC 2018) to minimize erosion during construction, operation, and maintenance activities.
- To minimize the introduction and spread of invasive species in the ROW, access roads, and adjacent areas, TVA would follow standard operating procedures consistent with Executive Order (EO) 13112 (Invasive Species) for revegetating the areas with noninvasive plant species as defined by TVA (2017b).
- Avoid direct impacts to ospreys or herons by conducting transmission line work outside of nesting season and coordinate with USDA APHIS to develop a mitigation plan if construction activities may occur within 660 feet of active osprey or heron nests.
- Ephemeral streams that could be affected by the proposed construction would be protected by implementing standard BMPs as identified in TVA (2017b) and the *Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas* (Alabama SWCC 2018).
- Perennial and intermittent streams would be protected by the implementation of Standard Stream Protection (Category A), Protection of Important Streams, Springs, and Sinkholes (Category B), or Protection of Unique Habitat (Category C) as defined by TVA (2017b).
- In areas requiring chemical treatment, only USEPA-registered and TVA approved herbicides would be used in accordance with label directions designed, in part, to restrict applications near receiving waters and to prevent unacceptable aquatic impacts.

2.6 THE PREFERRED ALTERNATIVE

TVA's preferred alternative for fulfilling its purpose and need is the Proposed Action Alternative. This alternative would generate renewable energy for TVA and its customers with only minor direct and indirect environmental impacts due to the implementation of BMPs and minimization and mitigation efforts, as described in Section 2.5.1 and Section 2.5.2. Implementation of the Project would help meet TVA's renewable energy goals and would help TVA meet customer-driven energy demands on the TVA system.

CHAPTER 3

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

3.1 LAND USE

This section describes an overview of existing land use in the Project Area and potential impacts to land use associated with the No Action and Proposed Action Alternatives.

3.1.1 Affected Environment

Land use is defined as the way people use and develop land, including leaving land undeveloped or using land for agricultural, residential, commercial, and industrial uses. Images generated with the National Land Cover Database (NLCD) evaluation, visualization, and analysis tool show the Project Area as cultivated crops and pastures with scattered areas of woody wetlands and forest (Figure 3-1).

The 1,850-acre Project Site consists of flat to gently rolling terrain that ranges in elevation from approximately 595 to 674 feet above mean sea level. Topography is highest on the central and southeastern portions of the Project Site, decreasing toward the northwest. Approximately one percent (27 acres) of the Project Site contains pervious and impervious roads and various buildings providing agricultural support. Approximately 52 percent (966 acres) of the Project Site's total area is cultivated crops and pastures. The remaining 47 percent (857 acres) of the Project Site consists of forested areas and woody wetlands.

US Highway 72 (US 72) extends along portions of the western boundary of the Project Site, and CR 33 generally frames the northern boundary of the Project Site. CR 33 also extends northeast-southwest, bisecting the central portion of the Project Site. Agricultural, rural-residential, and undeveloped land uses dominate the landscape south and east of the Project Site. Several businesses are present alongside US 72 north and west of the Project Site. North of CR 33, along Ruby Johnson Drive, a small residential concentration is adjacent to the southwestern portion of the Project Site. Another small residential concentration exists south of CR 33, along Belle Drive, adjacent to the southwestern portion of the Project Site. The closest municipality is the Town of Hollywood, where approximately 1,000 people reside (U.S. Census Bureau [USCB] 2019). Approximately 49 percent (906 acres) of the Project Site is within Hollywood town limits.

Available historical aerial photographs and topographic quadrangles document that land use in the Project Area has remained relatively unchanged, at least since the early 1950s but likely earlier, based on historical trends (U.S. Geological Service [USGS] 2019c). Throughout this time, land uses in the Project Area have been primarily agricultural and rural-residential, and major elements, such as US 72, CR 33, and some TLs have been present for some time.

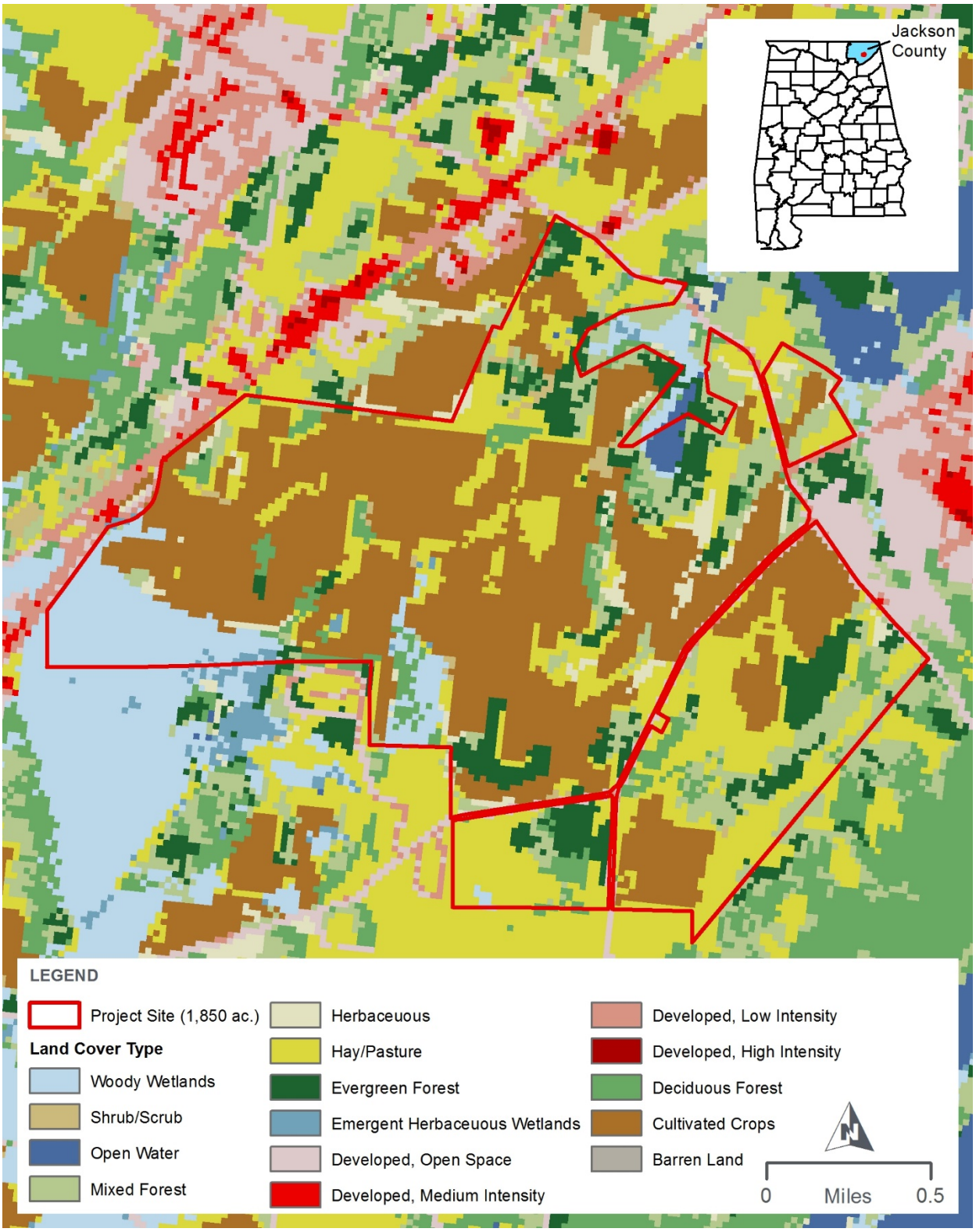

Figure 3-1. Land cover in the Project Area

Primary changes in the area between the 1980s and 2010s were largely driven by the construction of the Bellefonte Nuclear Plant, which included construction of additional TLs, development of the small residential concentrations along CR 33, and the widening of US 72 to a four-lane roadway with a two-way left-turn lane.

3.1.2 Environmental Consequences

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

3.1.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no Project-related impacts to land use would result. Existing land uses would be expected to remain a mix of agricultural and undeveloped land.

3.1.2.2 Proposed Action Alternative

Under the Proposed Action, the construction and operation of the solar facility would change the land use of the 997-acre limits of disturbance within the Project Site from agricultural to solar. The residual 853 acres of the Project Site would remain undeveloped with no farming or other activities occurring on them outside of mowing/maintenance required for facility operations. Because the Project Site is considered rural with no zoning restrictions, the development of the Project Site as a solar facility is compatible with current land uses. Existing industrial land uses are present alongside US 72 north and west of the Project Site and east of the Project Site at the Bellefonte Nuclear Plant. The addition of the solar facility would result in an expansion of industrial land use to the southeast, where agricultural uses currently dominate. Following decommissioning of the solar facility, a large portion of the proposed Project Site could return to agricultural use or could be used for residential or other development depending on any zoning ordinances in effect.

Since the Project is proposed to be located on primarily agricultural land and there are no outdoor recreation areas in the vicinity, development of the Project would have no impact on public recreation activities or facilities. The activities associated with the Project would not have any indirect effects on land use.

3.2 GEOLOGY, SOILS, AND PRIME FARMLAND

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

3.2.1 Affected Environment

3.2.1.1 Geology

The Project Area is located in the Appalachian Plateau physiographic province of the Appalachian Highlands division (NPS 2017; USGS 2018). In the contiguous U.S., the Appalachian Plateau

extends between Alabama and New York, spanning approximately 1,000 miles. The Appalachian Plateau is an elevated area between the Interior Plains and Atlantic Plain. The Project is in the Cumberland Plateau section and dates to the late Paleozoic Era (LandScope America 2019; NPS 2019). The Cumberland Plateau rises about 1,000–1,500 feet above the adjacent provinces and is formed by layers of near horizontal Pennsylvanian sandstones, shales, conglomerates, and coals, underlain by Mississippian and older shale and limestones. The sandstones are resistant to erosion and have produced a relatively flat landscape cut by deep stream valleys.

The Project Area is underlain by the Nashville and Stones River Groups of Middle Ordovician age and the Knox Group of Upper Cambrian to Lower Ordovician age. The Nashville Group is characterized by light to medium-gray, thin to flaggy-bedded, partly argillaceous wackestone/packstone with interbedded lime mudstone. The lower part of the Stones River Group is similar to and undifferentiated from the Nashville Group. The upper part of the Stones River Group is characterized by light olive gray to medium gray thin- to thickly-bedded, fossiliferous limestone with rare light olive gray, very fine-grained calcareous sandstone. The Knox Group is characterized by very light to medium gray, finely crystalline, siliceous dolomite and minor light gray to light bluish gray silty limestone (Geological Survey of Alabama 2009).

3.2.1.2 Paleontology

Alabama was a shallow, tropical sea during the Paleozoic Era. Erosion and deposition of sediments into the sea created a broad, tropical coastal plain where primitive trees and fern-like plants thrived. These forests are the source of the coal deposits across much of northern Alabama. The Permian was mainly a time of erosion, and no deposits of this period are known in the state (Paleontology Portal 2019).

3.2.1.3 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. Conditions do not exist on the Project Site for a majority of these types of hazards. The Project Area is located on relatively stable ground, and no significant slopes are present within several miles; therefore, landslides are not a potential risk. No volcanoes are present within several hundred miles of the Project Site. The Project Site is located in an area with carbonate bedrock geology and karst landforms associated with a high risk for sinkholes.

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Land over sinkholes may stay intact until there is not enough support for the land above the spaces. Then, a sudden collapse of the land surface can occur. These collapses can vary greatly in size and shape (USGS 2019a). GIS data generated by the Geological Survey of Alabama shows mapped sinkholes within the Project Site (Geological Survey of Alabama 2011). Of the identified sinkhole locations, only one sinkhole was confirmed during field investigations. Other potential/historic sinkholes were noted during the geotechnical investigation as currently being only depressional areas that had likely been filled during the previous farming operation at the Project Site.

Seismic activity at the Project Site could cause surface faulting, ground motion, ground deformation, and conditions including liquefaction and subsidence. The Modified Mercalli Scale is used within the United States to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of "g," the acceleration due to gravity. The USGS Earthquake Hazards Program publishes seismic hazard map data layers that display the PGA with ten percent (one in 500-year event) probability of exceedance in 50 years. The potential ground motion for the Project Area is 0.18g, for a PGA with a two percent probability of exceedance within 50 years (USGS 2014). A 0.18g earthquake will have a very strong perceived shaking with moderate potential for structural damage. The Project Site has moderate risk for earthquakes that will cause structural damage.

3.2.1.4 Soils

The Project Site contains 45 soil types. The majority of the mapped soils on the Project Site are composed of Cumberland silty clay loam (24.9 percent), Colbert silty clay (12.5 percent), Abernathy-Emory silt loams (11.8 percent), Capshaw silt loam (7.7 percent), and Melvin silt loam (7.0 percent), with other types of soil consisting of less than five percent each (Figure 3-2 and Table 3-1). Two of the four Cumberland silty clay loam types, three of the four Colbert silty clay loam types, both of the Abernathy-Emory silt loam types, both of the Capshaw silt loam types, and the Melvin silt loam are classified as prime farmland soils (USDA 2019a). These soil types are described in Section 3.2.1.5.

The Cumberland series soils are a member of the fine, mixed, thermic family of Rhodic Paleudalfs. These soils have dark reddish brown silt loam A horizons and dark red clay B horizons. The Colbert series soils consist of deep, moderately well drained, very slowly permeable soils that formed in residuum weathered from argillaceous limestone or shaly limestone. These soils are on uplands of limestone valleys. The rate at which water runs off the surface is slow to rapid. Slopes range from one to 25 percent. The Abernathy series soils consist of very deep, well drained, moderately permeable soils. These soils formed in weakly developed local alluvium over residuum weathered from limestone or old alluvium. They are in intermittent drainage ways. Slopes range from zero to six percent. The Emory series soils consist of very deep, well drained, moderately permeable soils. These soils formed in local alluvium and the underlying buried soil. They are in narrow strips along intermittent drainage ways, on toe slopes, and in bottoms of upland depressions. Slopes range from zero to four percent. The Capshaw series soils consist of deep and very deep, moderately well drained soils on stream terraces, in depressions, and on upland flats. Slopes range from zero to 12 percent. The Melvin series soils consist of very deep, poorly drained soils formed in silty alluvium on flood plains and in upland depressions. Slopes range from zero to two percent.

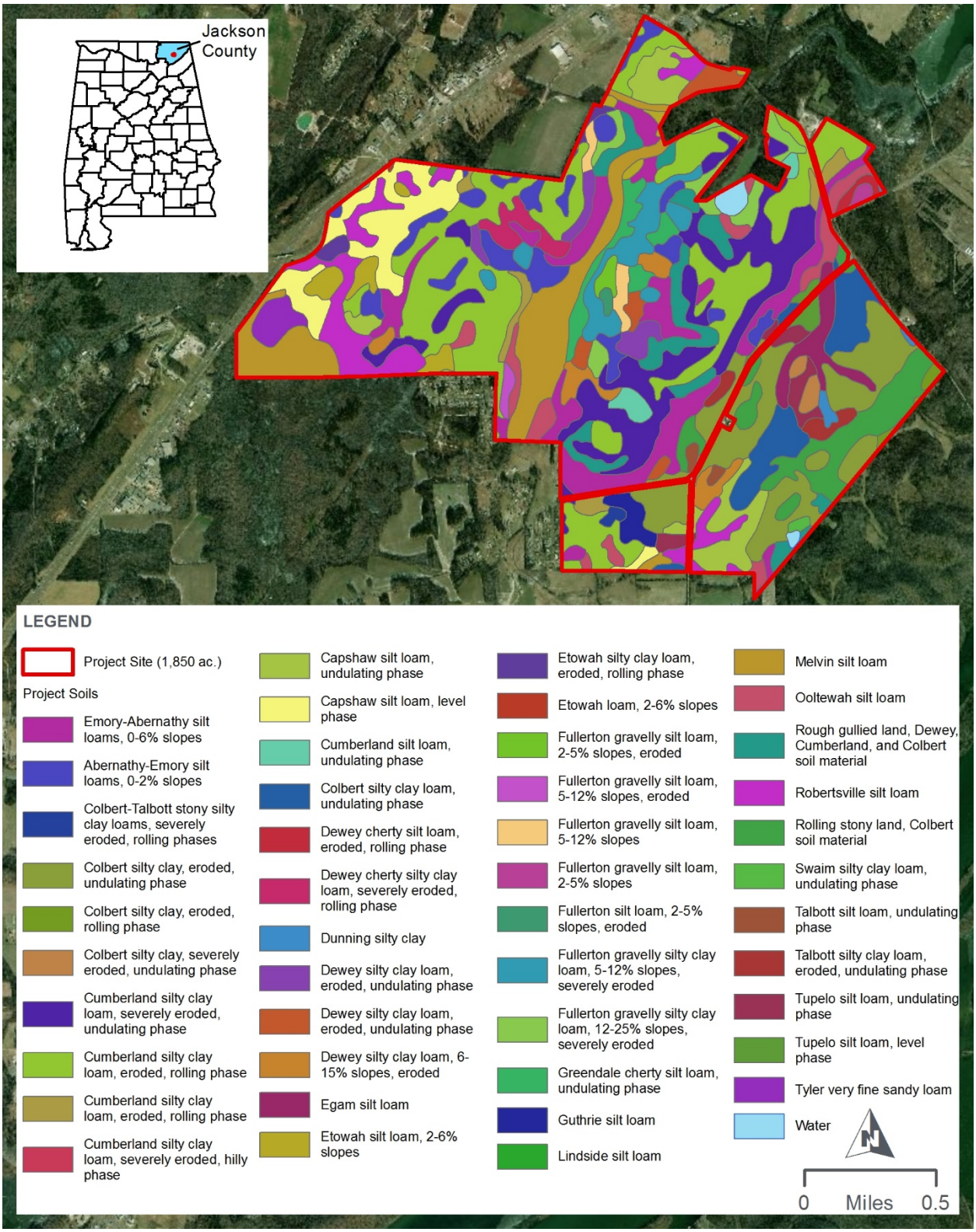

Figure 3-2. Soils on the Project Site

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 Farmland Protection Policy Act ([FPPA]; 7 United States Code [U.S.C.] 4201 *et seq.*) requires federal agencies to consider the adverse effects of their actions on prime or unique farmlands. The purpose of the FPPA is "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses." Table 3-1 describes the soil types, including those classified as prime farmland, located on the Project Site. Hydric rating is an indicator of the percentage of a map unit that meets the criteria for hydric soils (USDA 2019b). Hydric soils are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Five soils on the Project Site have hydric ratings of 66 to 99 percent (Dunning silty clay, Guthrie silt loam, Melvin silt loam, Ooltewah silt loam, and Robertsville silt loam) and 25 other soils have hydric ratings of one to 33 percent.

Table 3-1. Soils on the Project Site

Soil type	Farmland classification	Hydric Rating	Area (acres)	Percentage of Project Site
Emory-Abernathy silt loams, 0 to 6 percent slopes	All areas are prime farmland	0	138.1	7.5%
Abernathy-Emory silt loams, 0 to 2 percent slopes	All areas are prime farmland	0	79.0	4.3%
Colbert silty clay, eroded, undulating phase	Farmland of statewide importance	3	153.3	8.3%
Colbert silty clay, severely eroded, undulating phase	Farmland of statewide importance	3	7.8	0.4%
Cumberland silty clay loam, severely eroded, rolling phase	Farmland of statewide importance	3	155.7	8.4%
Cumberland silty clay loam, eroded, undulating phase	All areas are prime farmland	3	283.6	15.3%
Cumberland silty clay loam, eroded, rolling phase	Farmland of statewide importance	3	21.4	1.2%
Capshaw silt loam, undulating phase	All areas are prime farmland	3	61.7	3.3%
Capshaw silt loam, level phase	All areas are prime farmland	3	81.1	4.4%
Cumberland silt loam, undulating phase	All areas are prime farmland	3	11.7	0.6%

Soil type	Farmland classification	Hydric Rating	Area (acres)	Percentage of Project Site
Colbert silty clay loam, undulating phase	Farmland of statewide importance	3	61.8	3.3%
Dewey cherty silt loam, eroded, rolling phase	Farmland of statewide importance	3	5.0	0.3%
Dewey cherty silty clay loam, severely eroded, rolling phase	Farmland of statewide importance	3	19.0	1.0%
Dunning silty clay	Farmland of statewide importance	85	5.2	0.3%
Dewey silty clay loam, severely eroded, rolling phase	Farmland of statewide importance	3	20.7	1.1%
Dewey silty clay loam, eroded, undulating phase	All areas are prime farmland	3	22.1	1.2%
Dewey silty clay loam, 6 to 15 percent slopes, eroded	Farmland of statewide importance	0	27.3	1.5%
Egam silt loam	All areas are prime farmland	3	28.0	1.5%
Etowah silt loam, 2 to 6 percent slopes	All areas are prime farmland	0	28.1	1.5%
Etowah silty clay loam, eroded, rolling phase	Farmland of statewide importance	3	8.1	0.4%
Etowah loam, 2 to 6 percent slopes	All areas are prime farmland	0	0.4	0.0%
Fullerton gravelly silt loam, 2 to 5 percent slopes, eroded	All areas are prime farmland	0	5.3	0.3%
Fullerton gravelly silt loam, 5 to 12 percent slopes, eroded	Farmland of statewide importance	0	4.6	0.2%
Fullerton gravelly silt loam, 5 to 12 percent slopes	Farmland of statewide importance	0	11.4	0.6%
Fullerton gravelly silt loam, 2 to 5 percent slopes	All areas are prime farmland	0	3.1	0.2%
Fullerton silt loam, 2 to 5 percent slopes, eroded	All areas are prime farmland	0	2.5	0.1%
Fullerton gravelly silty clay loam, 5 to 12 percent slopes, severely eroded	Farmland of statewide importance	0	48.3	2.6%

Soil type	Farmland classification	Hydric Rating	Area (acres)	Percentage of Project Site
Greendale cherty silt loam, undulating phase	All areas are prime farmland	0	29.1	1.6%
Lindside silt loam	All areas are prime farmland	3	0.0	0.0%
Melvin silt loam	Farmland of statewide importance	85	129.1	7.0%
Ooltewah silt loam	Farmland of statewide importance	85	46.2	2.5%
Robertsville silt loam	Farmland of statewide importance	85	78.8	4.3%
Talbott silt loam, undulating phase	All areas are prime farmland	3	4.7	0.3%
Talbott silty clay loam, eroded, undulating phase	All areas are prime farmland	3	12.0	0.6%
Tupelo silt loam, undulating phase	Farmland of statewide importance	3	19.7	1.1%
Tupelo silt loam, level phase	Farmland of statewide importance	3	8.8	0.5%
Tyler very fine sandy loam	All areas are prime farmland	3	15.6	0.8%
	Total Prime Farmland		**806.1**	**43.5%**
	Total Farmland of Statewide Importance		**832.2**	**45.0%**

Source: USDA 2019a

The locations of prime farmland soils on the Project Site are shown on Figure 3-3. Based on information from USDA (2019a), prime farmland soils and soils of statewide importance occur on approximately 1,638 acres, constituting approximately 88.5 percent of the 1,850-acre Project Site.

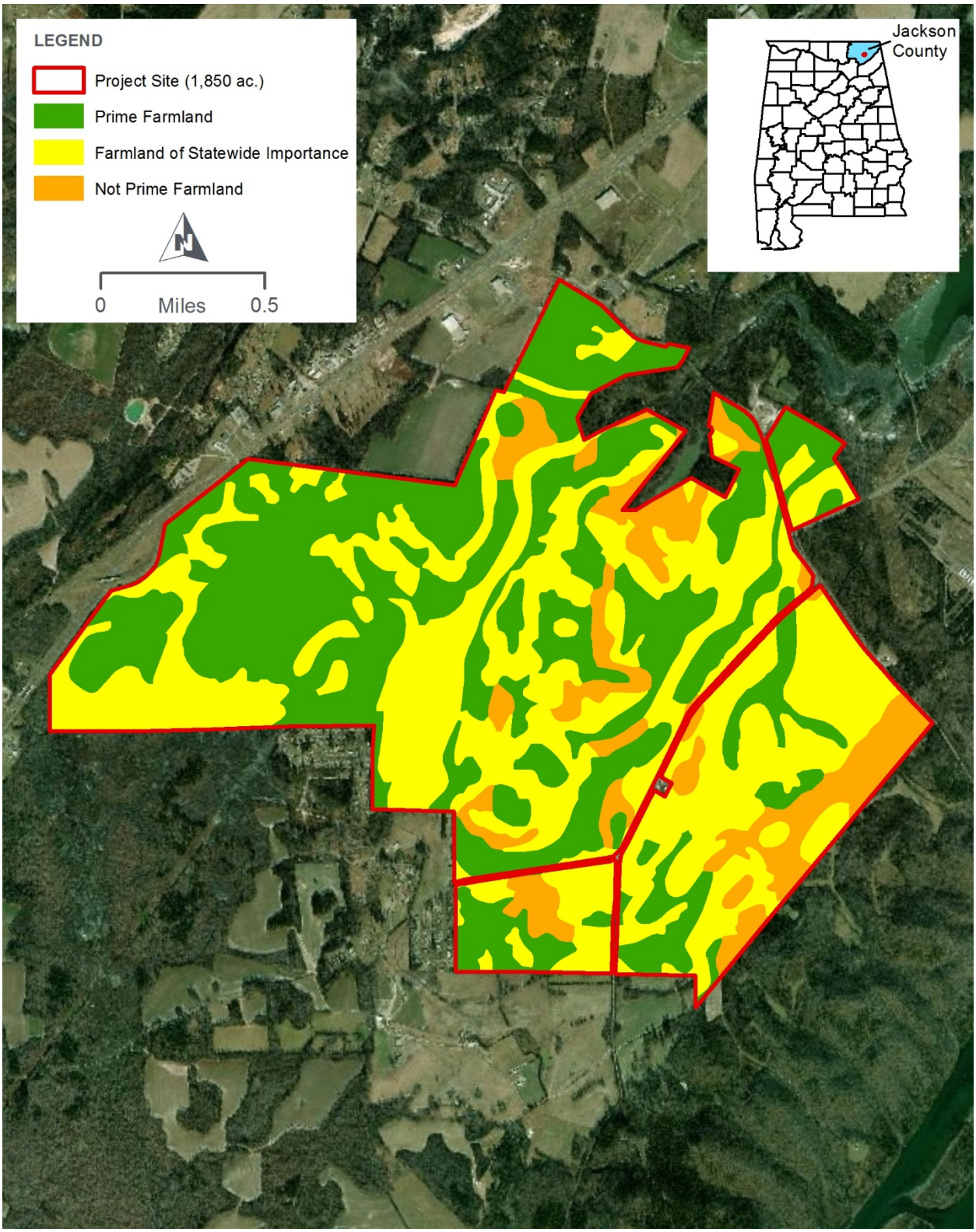

Figure 3-3. Soils classified as prime farmland on the Project Site

3.2.2 Environmental Consequences

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

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no direct or indirect Project related impacts on geological, paleontological, soil resources, or prime farmlands would result. Existing land use on the Project Site would be expected to remain a mix of agricultural and undeveloped land.

Over time, impacts to soils and geology could occur if the current land use practices are changed. For example, if agricultural practices were continued and proper conservation practices are not followed, such as terracing or application of soil amendments, soils could eventually become depleted in nutrients or erode, resulting in minor changes on the Project Site. If the Project Site were to be developed, changes to the soils on site would occur.

3.2.2.2 Proposed Action Alternative

Under the Proposed Action, minor direct impacts to geology and soil resources would occur as a result of construction and operation of the Project. Approximately 54 percent (997 acres) of the 1,850-acre Project Site would be cleared and/or graded for the solar facility and associated interconnection facilities. Grading and clearing for the solar facility would cause minor, localized increases in erosion and sedimentation, resulting in minor impacts to geology and soils.

Geology and Paleontology

Under the Proposed Action, minor impacts to geology could occur. The solar arrays would be supported by steel piles which would either be driven or screwed into the ground to a depth of seven to 15 feet. Any onsite sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. The PV panels would be connected to underground wiring placed in trenches about three feet deep. Additional minor excavations would also be required for construction of the Project Substation, each medium voltage transformer that would be collocated with each central inverter, and associated with the proposed Bellefonte Solar 161-kV Project Substation, the Hollywood 161-kV Switching Station, and gen-tie line. Due to the small sizes and shallow depth of the subsurface disturbances, only minor direct impacts to potential subsurface geological resources are anticipated.

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

Geologic Hazards

Hazards resulting from geological conditions may be encountered in the case of sinkholes. The Project Site is located in an area with carbonate bedrock geology and karst landforms associated

with a high risk for sinkholes. According to GIS data generated by the Geological Survey of Alabama, the Project Site may have mapped sinkholes (Geological Survey of Alabama 2011). Of the identified sinkhole locations, only one sinkhole was confirmed during field investigations. The proposed solar facility has been designed to avoid impacts to the known sinkhole.

There is also moderate potential for small to moderate intensity seismic activity. The solar facility would be designed to comply with applicable standards. Both seismic activity and sinkholes would likely only cause minor impacts to the solar facility and equipment on the Project Site. Geologic hazard impacts on the Project Site would be unlikely to impact offsite resources.

Soils

As part of the site preparation and construction process, approximately 997 acres of the Project Site would be developed or temporarily affected. Soils would be temporarily affected due to construction activities and tree-trimming during operation. Any stockpiled soils from the area where vegetation clearing and grading may occur would be replaced following cut-and-fill activities to the extent practical and, therefore, likely not require any offsite or onsite hauling of soils. However, some minimal offsite or onsite hauling may be necessary.

Although not anticipated, should borrow material be required, small amounts of sand and gravel aggregate may be obtained either from onsite activities within the 997-acre portion of the Project Site that would require clearing and some grading, or from local offsite sources. The creation of new impervious surface, in the form of the foundations for the central inverters, Bellefonte Solar 161-kV Project Substation, and the Hollywood 161-kV Switching Station, would result in a minor increase in stormwater runoff and a potential increase in soil erosion. Planting of native and/or noninvasive vegetation within the limits of disturbance and the use of BMPs described in the CBMPP (see Section 1.4.1) such as soil erosion and sediment control measures, would minimize the potential for increased soil erosion and runoff. Following construction, implementation of soil stabilization and vegetation management measures would reduce the potential for erosion impacts during site operations.

During operation of the solar facility, very minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement, inverter air filter replacement, fence repair, vegetation control, and periodic array inspection, repairs, and maintenance. The Project would implement mechanized landscaping using lawnmowers, weed eaters, etc. Trimming and mowing to maintain the vegetation at a height of approximately 18 inches would be performed as needed but is estimated to occur no more than three times per growing season. Selective spot applications of herbicides may be employed around structures to control weeds. Herbicides would be applied by a professional contractor or a qualified Project technician. These maintenance activities would not result in any adverse impacts to soils on the Project Site during operation.

Prime Farmland

Should the Proposed Action be implemented, approximately 54 percent (997 acres) of the 1,850-acre Project Site would be developed into the Bellefonte Solar Energy Center and associated interconnection infrastructure and removed from potential agriculture use. This would affect

approximately 421 acres of prime farmland or approximately 52 percent of the total prime farmland soils at the Project Site.

The construction and operation of the solar facility would remove approximately 421 acres of prime farmland from potential agricultural use and would result in the conversion of 997 acres of land from agricultural and undeveloped, forested land to a developed solar power facility. The remaining 853 acres, or approximately 46 percent of the Project Site, would remain undeveloped with no farming or other activities occurring on them outside of mowing/maintenance required for facility operations. Appropriate BMPs would be used to control erosion and limit sediment and soil from leaving the Project Site. During grading, topsoil would be removed and stockpiled and, as grading is nearing completion, redistributed over the graded areas. None of the soils on the Project Site have characteristics that would require special construction techniques or other non-routine measures. Upon decommissioning of the solar facility, once the facility components are removed and the Project Site is stabilized, farming could resume with little long-term loss of soil fertility and potential agricultural production.

In accordance with FPPA evaluation procedures, a USDA Farmland Conversion Impact Rating Form (Form AD-1006) was completed for the Project Site with input from the USDA Natural Resource Conservation Service (NRCS) (Appendix D). Form AD-1006 quantifies the potential impacts to prime farmland. The impact rating considers the acreage of prime farmland to be converted, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban environments, percentage of area currently being farmed, and compatibility with existing agricultural use. This form assigns a numerical rating between zero and 260 based on the area of prime farmland to be disturbed, the total area of farmland in the affected county, and other criteria. The impact rating score for the Project Site was 183.5 (Appendix D). Sites with a total impact rating score of at least 160 have a greater potential to adversely affect prime farmland and, thus, require more detailed consideration of alternative sites, including the evaluation of sites that may have less effects on prime farmland. The site selection criteria for the proposed solar facility are described in Section 2.3. Although the development of the potential alternative Widows Creek site may have resulted in less impacts on prime farmland than the Project Site, impacts to wetlands and streams, federally and state-listed species, and sensitive receptors for visual impacts on this site would likely have been greater than on the Project Site.

Based on the impact rating for the Project Site, effects on prime farmland would be adverse for the duration of the solar facility. Impacts to soils would otherwise be insignificant due to Project measures to preserve topsoil and minimize erosion, such as installing silt fencing and balancing cut-and-fill quantities. Following the eventual decommissioning and removal of the solar facility, the Project Site could be returned to agricultural use with little loss of soil productivity and insignificant long-term effects on agricultural production. Adverse impacts to soil productivity may also be offset by the beneficial impacts to soil health with the use of native and/or noninvasive vegetation.

3.3 WATER RESOURCES

This section provides an overview of existing water resources in the Project Area and the potential impacts on these water resources that would be associated with the No Action and Proposed

Action Alternatives. Components of water resources that are analyzed include groundwater, surface water, wetlands, and floodplains.

3.3.1 Affected Environment

3.3.1.1 Groundwater

Groundwater is water located beneath the ground surface within soils and subsurface formations known as hydrogeological units, or aquifers (USGS 1995). Aquifers have sufficient permeability to conduct groundwater and to allow economically significant quantities of water to be produced by man-made water wells and natural springs. The Knox Group, which consists of siliceous dolomite and silty limestone and the Nashville and Stones River Group, which consists of limestone with shale parings, are the major aquifers in the Cumberland Plateau section of the Appalachian Plateau physiographic province and underlie the majority of the Project Site in Jackson County.

Aquifers in the Appalachian Plateau physiographic province consist of permeable stratigraphic units within flat-lying sedimentary rocks of Paleozoic age. The Appalachian Plateaus are flat areas of undissected plateau that lie at high altitudes and are capped by resistant sandstone. These high areas resemble large mesas and are bounded by steep-faced slopes. Most of the Appalachian Plateau's aquifers are limestone units, which are productive aquifers because of the solution openings that develop in the soluble carbonate rocks. Erosion of the flat-lying rocks of the Appalachian Plateau physiographic province has produced isolated, sandstone-capped hills that rise several hundred feet above easily eroded limestone beds exposed in the Interior Low Plateau province. A thick black shale (the Chattanooga Shale) forms an effective basal confining unit for the ground-water flow system in the Appalachian Plateau aquifers. A thick sequence of permeable rocks, primarily limestone of Devonian to Cambrian age, underlies the Chattanooga Shale (USGS 1995).

Flow of groundwater in the Appalachian Plateau aquifers is affected primarily by topography, structure, and the development of solution openings in the rocks. Recharge to the aquifers occurs by precipitation on the flat, mesa-like plateau tops. The water then percolates downward through the interbedded Pennsylvanian rocks, primarily along steeply inclined joints and fractures. In places, shale beds retard the vertical flow, and some of the water is shunted laterally along bedding planes, mostly in sandstone and conglomerate beds, until it emerges as spring flow along steep valley walls, such as the Cumberland escarpment. Some of the water is able to leak downward across the thick shale confining unit into the underlying limestone aquifer. Solution openings in limestone under the Appalachian Plateau are developed primarily along the bases of the escarpments and do not extend far under the shale and sandstone. Water-quality data indicate that circulation has been sufficient to allow freshwater to displace saltwater from the limestone in most places. Karst topography commonly develops on the valley floors, especially where the cover of residuum is thin. Groundwater does not usually circulate to great depths in this type of geologic setting (USGS 1995).

The water quality in the Appalachian Plateau aquifer system is generally suitable for most uses. The quality of the water generally deteriorates with depth as it becomes more mineralized. In

places, dissolved-solids concentrations at depths of 300 feet or more in limestone aquifers are as large as 1,000 milligrams per liter (USGS 1995).

3.3.1.2 Surface Water

Surface water is any water that flows above ground and includes, but is not limited to, streams, ditches, ponds, lakes, and wetlands. Streams are classified as either perennial, intermittent, or ephemeral based on the occurrence of surface flow. Wetlands are those areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples of wetlands include swamps, marshes, bogs, and wet meadows.

Surface waters with certain physical and hydrologic characteristics (defined bed and bank, ordinary high water mark, or specific hydrologic, soil, and vegetation criteria) are considered Waters of the U.S. (or jurisdictional waters) and are under the regulatory jurisdiction of USACE. The CWA is the primary federal statute that governs the discharge of pollutants and fill materials into Waters of the U.S. under Sections 402, 404 and 401. The limits on activities affecting Waters of the U.S. are defined through a jurisdictional determination accepted by USACE. State agencies have jurisdiction over water quality.

The Project Site is located in the Riley Cove-Dry Creek and Town Creek-Guntersville Lake Subwatersheds (12-digit Hydrologic Unit Code [HUC] 060300010602 and 060300010408, respectively) and Upper Guntersville Lake and Mud Creek-Tennessee River Watersheds (HUC-10 0603000106 and 0603000104, respectively), in the Guntersville Lake Watershed (HUC-8 06030001; USGS 2019b). The Guntersville Lake Watershed is part of the Tennessee River Basin and is located in northeastern Alabama in portions of Blount, DeKalb, Etowah, Jackson, and Marshall Counties. The Guntersville Lake Watershed drains approximately 1,645 square miles to the Tennessee River.

The majority of the surface waters on the Project Site drain to the Town Creek-Guntersville Lake watershed (HUC 060300010408), and the onsite surface waters in the western most portion of the Project Site drain to the Riley Cove-Dry Creek watershed (HUC 060300010602). The Project Area drains to several unnamed tributaries of Dry Creek and Town Creek. Dry Creek drains south from the Project Area to its confluence with the Tennessee River approximately six miles southwest of the Project Site. Town Creek drains northeast from the Project Area to its confluence with the Tennessee River approximately two miles northeast of the Project Site. The branch of Town Creek that is located within the Project Site is classified by Alabama Department of Environmental Management (ADEM) for Fish and Wildlife use. While Guntersville Lake is considered a navigable water by USACE, the portion of Guntersville Lake located within the Project Site is not listed within ADEM's list of public water supply or the 2018 Alabama 303(d) list of impaired waters.

Field surveys of the Project Site were conducted February 18-22 and March 25-29, 2019 to determine the presence of potentially jurisdictional wetlands and streams. Wetlands on the Project Site were identified in accordance with methodologies described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (1987 Manual) (USACE 1987) and the Eastern Mountains and Piedmont regional supplement to the 1987 Manual (USACE 2012). Streams were classified

utilizing the methodology and guidance provided in Regulatory Guidance Letter (RGL) 05-05. The survey results and preliminary jurisdictional determinations of onsite water resources identified during the field survey were submitted to USACE for confirmation of their jurisdictional status in May 2019 (Appendix D). A total of 32 jurisdictional wetlands (173.96 acres), four jurisdictional ponds (9.27 acres), and 16 jurisdictional stream channels (29,707 linear feet) were identified within the 1,850-acre Project Site. Surface water locations are shown in Figures 3-4, 3-5, 3-6, and 3-7.

TVA is subject to Executive Order (EO) 11990, Protection for Wetlands. EO 11990 states that unavoidable impacts to streams and wetlands should be compensated through a process known as compensatory mitigation. Wetlands on the Project Site were classified by hydrologic regime and vegetation cover type in accordance with the Cowardin Classification System (Cowardin et. al. 1979). Three wetland types were identified onsite: palustrine emergent (PEM; 5.91 acres), palustrine forested (PFO; 167.42 acres), and palustrine scrub-shrub (PSS; 0.63 acre) wetlands, for a total of 173.96 acres of potentially jurisdictional wetlands. PEM wetlands were typically found in agricultural settings and were highly disturbed by agricultural activities, resulting in vegetation dominated by emergent vegetation, such as giant cane (*Arundinaria gigantea*), soft rush (*Juncus effusus*), and various sedges (*Carex* spp.). PFO wetlands were typically dominated by various hardwood tree species such as green ash (*Fraxinus pennsylvanica*), loblolly pine (*Pinus taeda*), American elm (*Ulmus americana*), willow oak (*Quercus phellos*), and shagbark hickory (*Carya ovata*). The one PSS wetland was in an agricultural setting and was dominated by Chinese privet (*Ligustrum sinense*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and American elm.

3.3.1.3 Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in floodplains to ensure that the Project is consistent with the requirements of EO 11988, Floodplain Management and local floodplain regulations.

The Federal Emergency Management Agency (FEMA) produces maps that show the likelihood of flooding in a particular area. These maps are used to determine eligibility for the National Flood Insurance Program (NFIP). The NFIP intends to reduce the impact of flooding on private and public structures by encouraging communities to adopt and enforce floodplain management regulations to help mitigate the effects of flooding on buildings. The Town of Hollywood participates in the NFIP. EO 11988, Floodplain Management, requires federal agencies to “avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative…”

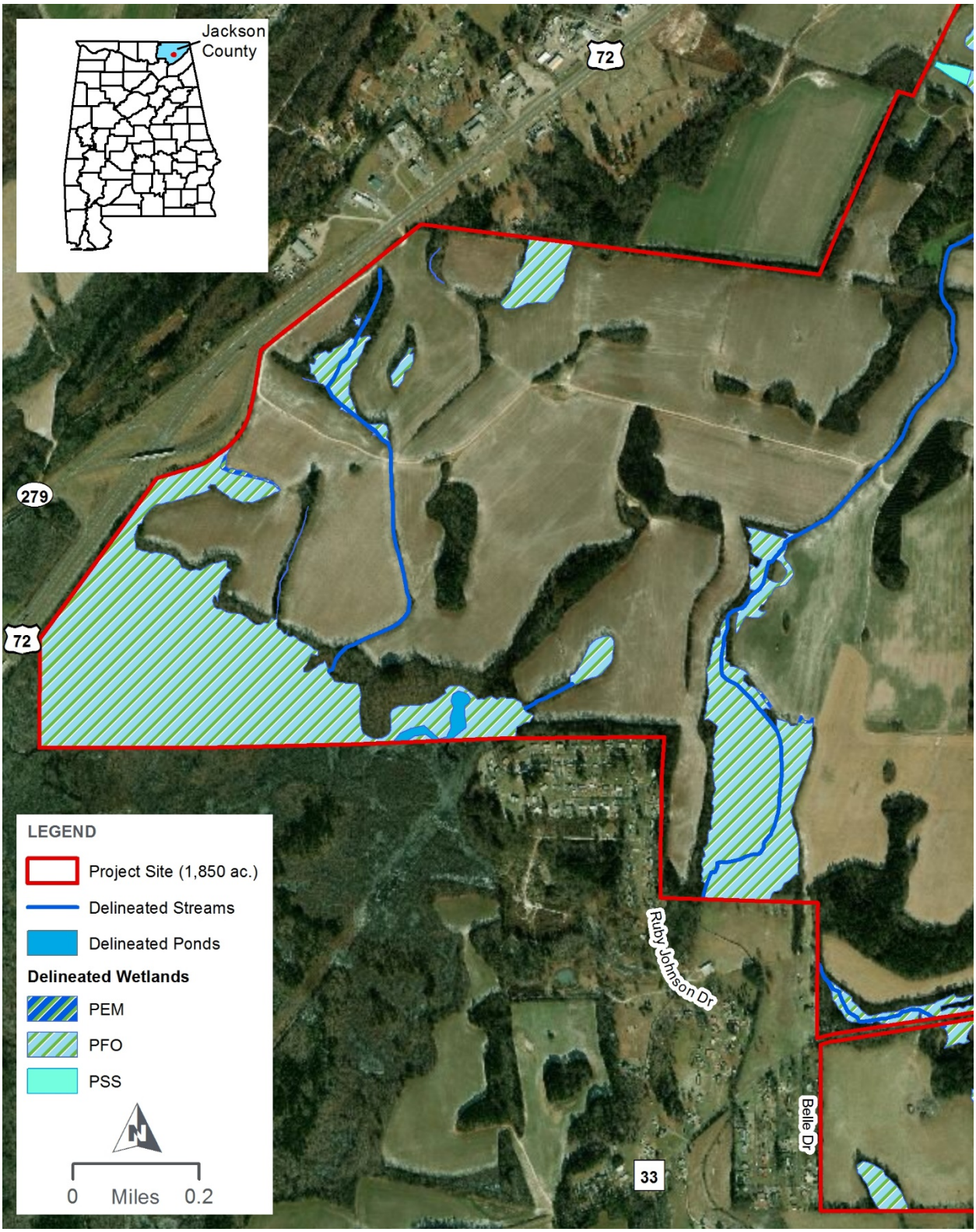

Figure 3-4. Aerial photo showing wetlands and streams on the Project Site (West)

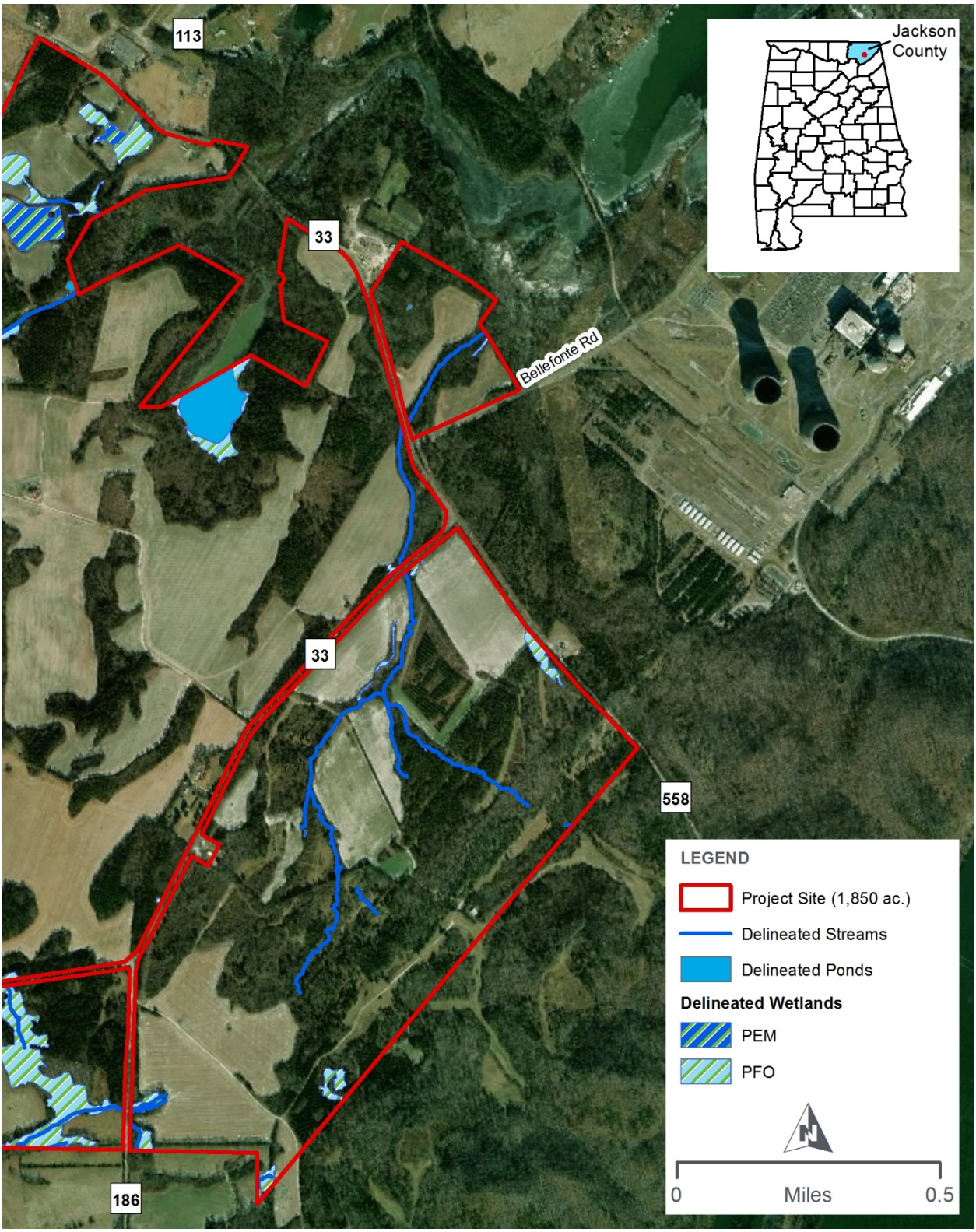

Figure 3-5. Aerial photo showing wetlands and streams on the Project Site (East)

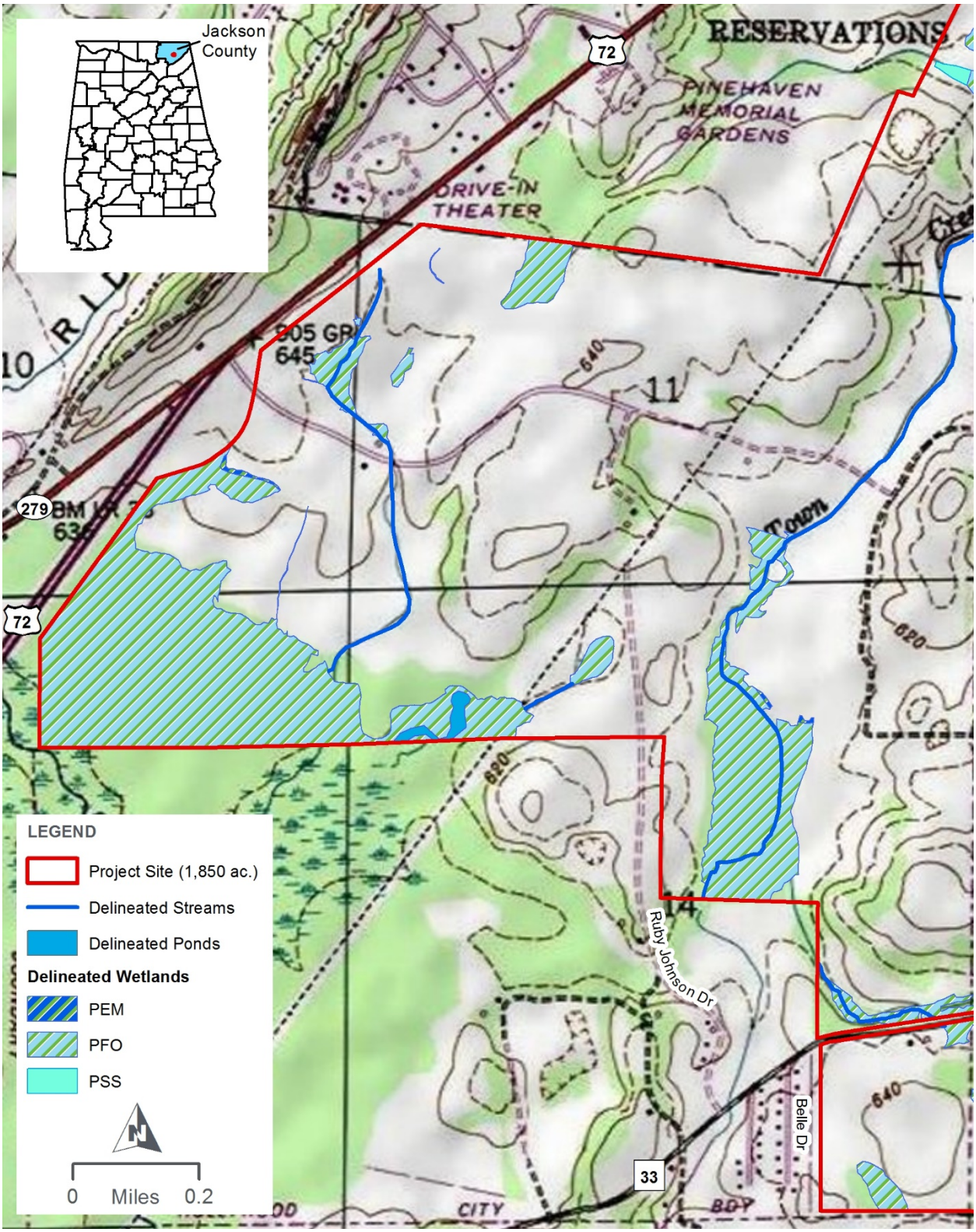

Figure 3-6. Topographic quadrangles showing wetlands and streams on the Project Site (West)

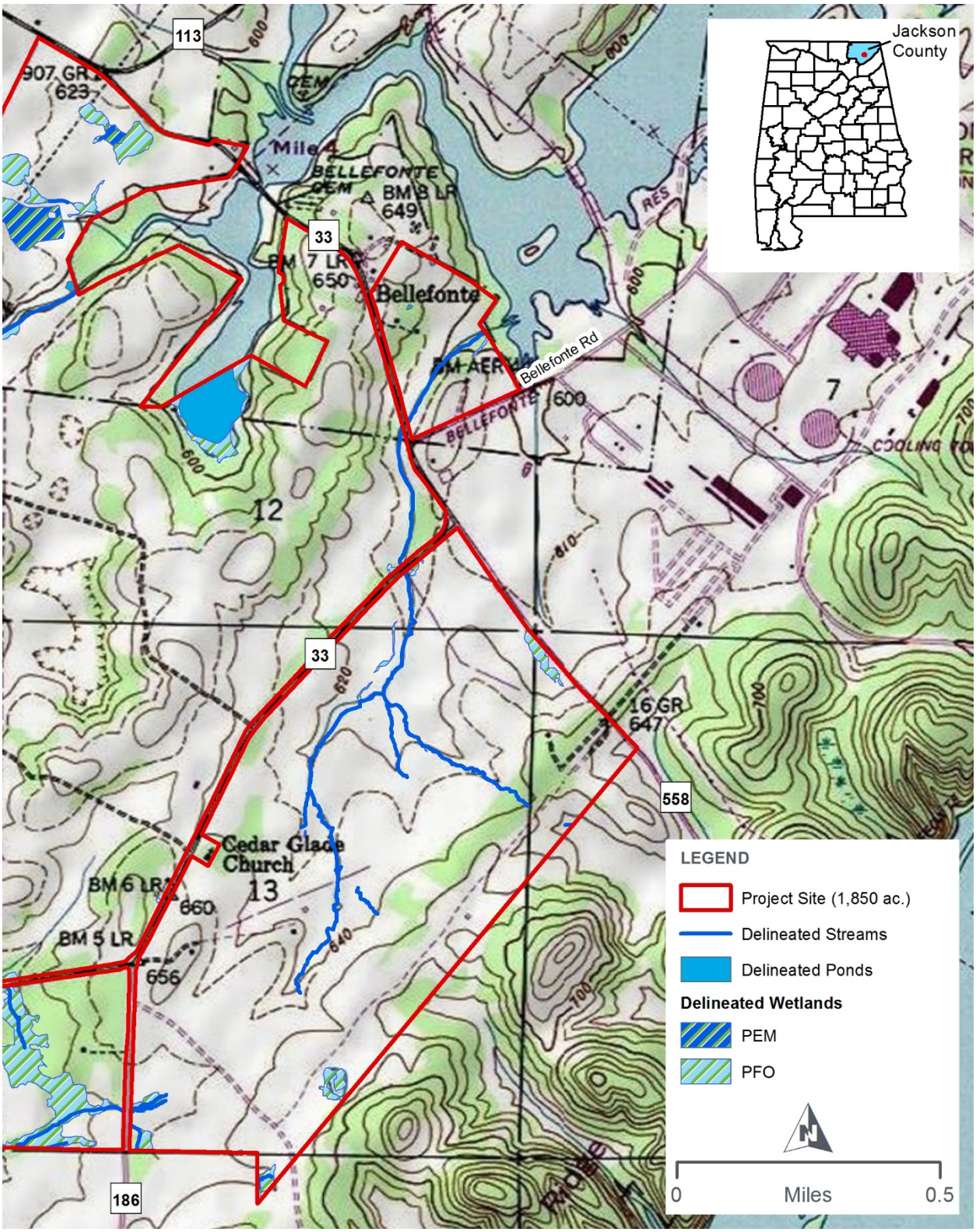

Figure 3-7. Topographic quadrangles showing wetlands and streams on the Project Site (East)

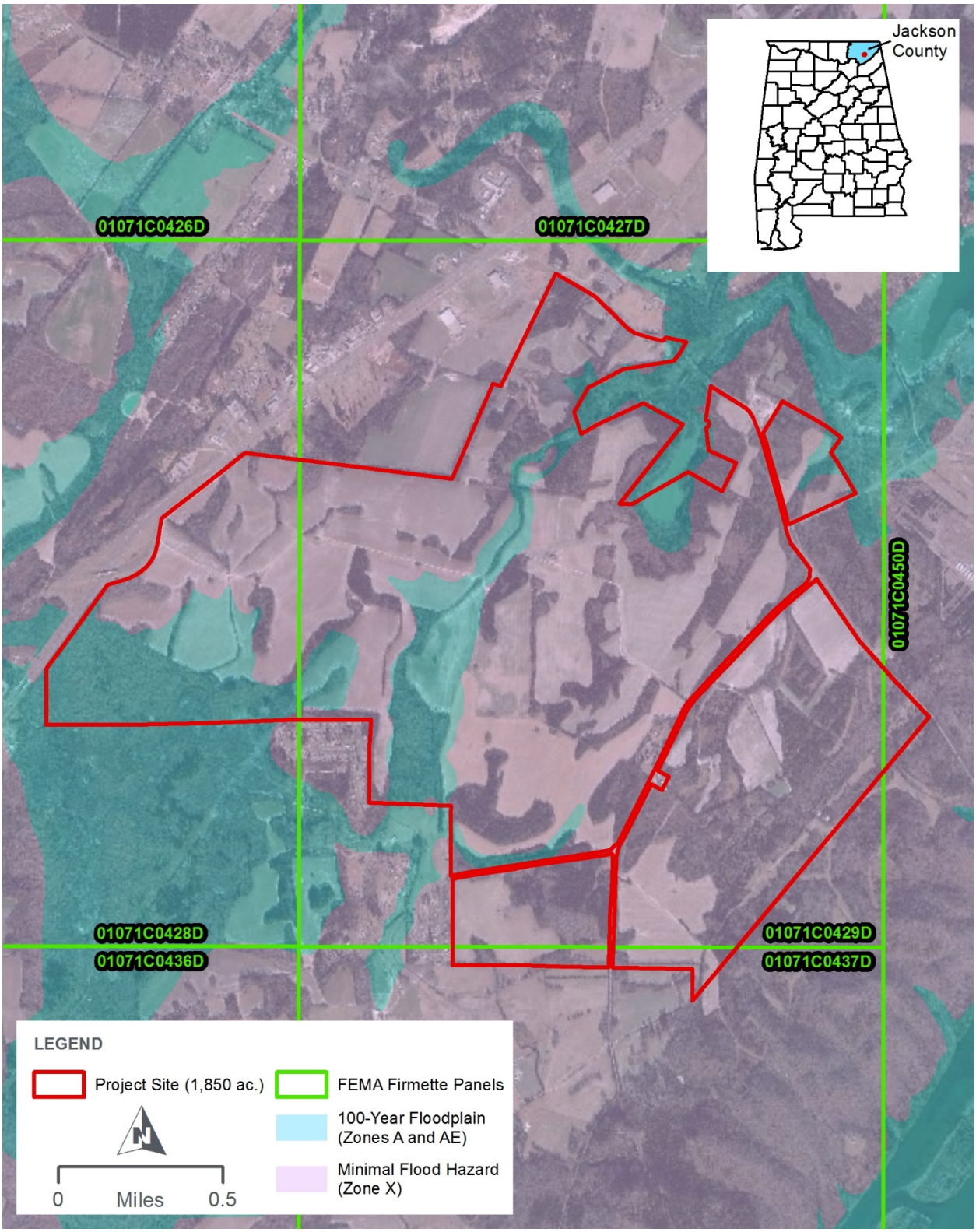

Figure 3-8. Floodplains in the Project Area

Two FEMA-designated floodplains, one associated with Dry Creek and one associated with Town Creek (Jackson County, Alabama, Flood Insurance Rate Map [FIRM] Panels 01071C0428D, 01071C0429D, 01071C0437D, and 01071C0450D, all with an effective date of December 16, 2008), are located on the Project Site (FEMA 2018). The floodplains are designated as Zone A (areas with a one percent annual chance of a flood event and no base flood elevations or flood depths have been determined) and Zone AE (areas with a one percent annual chance of a flood event where base flood elevations or flood depths have been determined) and are located in the southwestern and northeastern portions of the Project Site, as shown in Figure 3-8.

3.3.2 Environmental Consequences

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

3.3.2.1 No Action Alternative

Under the No Action Alternative, the proposed Project would not be constructed; therefore, no direct Project related impacts to water resources would be expected to occur. Existing land use would remain a mix of agricultural and undeveloped land, and water resources would remain as they are at the present time. Indirect impacts to water resources could occur due to continuing agricultural use of the Project Site. Increases in erosion and sediment runoff could occur if farming practices were not maintained using BMPs. Erosion and sedimentation onsite could alter runoff patterns on the Project Site and impact downstream surface water quality. In addition, if the local aquifers are recharged from surface water runoff, the use of chemical fertilizers and pesticides could impact both the surface water and groundwater.

3.3.2.2 Proposed Action Alternative

Under the Proposed Action, only minor impacts from construction would be expected to streams, wetlands, or floodplains. Beneficial, indirect impacts to groundwater and surface water could result from the change in land use, including a reduction in fertilizer and pesticide runoff, the improvement of water quality by filtering through permanent native and/or noninvasive plant cover, and the reduced likelihood of erosion and sedimentation.

Groundwater

No direct adverse impacts to groundwater would be anticipated as a result of the Proposed Action. The PV panels would have a relatively minor effect on groundwater infiltration and surface water runoff because the panels would not include a runoff collection system. Rainwater would drain off the panels to the adjacent vegetated ground. Hazardous materials that could potentially contaminate groundwater would be stored on the Project Site during construction. The minimal use of petroleum fuels, lubricants, and hydraulic fluids during construction and by maintenance vehicles would result in the potential for small onsite spills. However, 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. Project activities could potentially cause erosion resulting in the movement of sediment into groundwater infiltration zones. BMPs, such as those described in TVA's *A Guide for Environmental Protection and Best*

Management Practices for Tennessee Valley Authority Construction and Maintenance Activities (TVA 2017b), would be used to avoid contamination of groundwater from Project activities. Fertilizers and herbicides would be used sparingly and in accordance with manufacturer's recommendations to avoid contamination of groundwater. Additionally, beneficial indirect impacts to groundwater could result from the change in land use.

Construction-related Water Needs

Water and sewer treatment services are currently not available at the Project Site. However, both are anticipated as onsite needs during construction of the solar facility. Construction-related water use would support site preparation (including dust control) and grading activities. During earthwork for the grading of access roads, foundations, equipment pads, and other components, the primary use of water would be for compaction and dust control. Smaller quantities would be required for preparation of the equipment pads and other minor uses.

Water used during construction would be provided via proposed Project groundwater wells or by delivery via water trucks. If selected, up to four groundwater wells would be installed in different locations throughout the Project Site to provide access during construction and reduce the potential for any significant water level drawdown. Bellefonte Solar would perform groundwater drilling and testing to gather information on aquifer characteristics and develop a plan for the production well design. If required, water-based drilling muds would be collected and dewatered, with runoff occurring locally into nearby field areas. Dewatered muds would be non-toxic and could be distributed as subsoil during site grading. If determined necessary, sewer treatment would be accomplished through use of a pump-out septic holding tank.

If installed, groundwater wells and the septic holding tank would be appropriately permitted and constructed to avoid impacts to groundwater. None of the proposed options for water and water-related needs would adversely affect available groundwater resources.

Operation and Maintenance-related Water Needs

The primary uses of water during operation and maintenance-related activities would be for possible dust control (the proposed PV technology requires no water for the generation of electricity) and bathrooms in the potential operations and maintenance building. The internal access roads would not be heavily traveled during normal operation and consequently, water use for dust control is not expected. Many of the existing roads are paved and would not result in additional dust. Equipment washing and any potential dust control discharges would be handled in accordance with BMPs for water-only cleaning.

Precipitation in the area is adequate to minimize any buildup of dust and other matter on the PV panels that would reduce energy production; therefore, no regular panel washing is anticipated. The panels would be cleaned if a specific issue was identified or depending on the frequency of rainfall, proximity of arrays to sources of airborne particulates, and other factors.

Water needs during operation and maintenance would be provided either via the proposed Project wells also used during construction or by delivery via water trucks and would not adversely affect groundwater resources.

Decommissioning and Site Reclamation-related Water and Wastewater Needs

Because conditions can change during the course of the Project, a final Decommissioning and Closure Plan would be created based on site conditions at the time of facility closure.

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

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

Overall Groundwater Impacts

Due to the small volume of groundwater anticipated to be needed for the Project compared to the overall withdrawal rate for the combined Valley and Ridge, Appalachian Plateaus, and Interior Low Plateaus aquifers of approximately 149 million gallons per day (USGS 1995), impacts to the local aquifers and groundwater in general are not anticipated. The use of BMPs and a CBMPP would reduce the possibility of any onsite hazardous materials reaching the groundwater during operation or maintenance. Overall, impacts to groundwater would not be anticipated.

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

Surface Water

During the facility design process, impacts to onsite streams and wetlands were avoided or minimized. Complete avoidance of water features was not feasible, and the construction and operation of the Project would permanently affect one wetland (0.05 acre) due to the construction of the Hollywood Switching Station. Impacts to jurisdictional water features would not be expected from the installation of buried cables with the use of boring. Additionally, access roads and all other project elements have been routed to avoid impacts to jurisdictional water features.

Sinkholes are surface water to groundwater aquatic features, which can sustain impacts due to degraded water quality from construction storm water, chemical and solid waste run-off. TVA generally protects these features by treating them just as they would a stream and providing a buffer zone to adequately protect them. If sinkholes need to be filled then Class V Injection Well permits may be required. Also only herbicides that are noted as safe for caves/karst features should be used near these features. Any pesticide or herbicide use as part of construction or operation activities would comply with the ADEM Pesticide General Permit, associated with

Permit ALR100000 described in Section 1.4. Proper implementation and application of these products may result in minor impacts to surface water. As described above for groundwater, beneficial indirect impacts to onsite surface water would be expected to result from the change in land use.

Streams

The Proposed Action would not result in direct, permanent impacts to jurisdictional streams. BMPs would be used to minimize sediment runoff during construction; therefore, indirect, temporary impacts to streams would be minimized.

Wetlands

In the Project design process, care was taken to avoid or minimize wetland impacts where practicable. Therefore, this Project is consistent with the requirements of EO 11990. However, complete avoidance of wetlands was not feasible due to the existence of a PFO wetland where the Hollywood Switching Station is planned. Under the Proposed Action, minor direct adverse impacts to potentially jurisdictional wetlands are expected to occur.

Cumulative Surface Water Impacts

Potential impacts to surface waters during construction would be minimized through the use of BMPs for controlling soil erosion and runoff. These BMPs include the use of 50-foot buffer zones surrounding potentially jurisdictional streams and wetlands and the installation of erosion control silt fences and sediment traps. Therefore, through the use of BMPs and avoidance measures, impacts to surface waters during construction would be minor. The operation and maintenance of the solar facility would have little impact on surface water, and BMPs would be used during any maintenance activities that have the potential to cause runoff of sediment and pollutants.

Due to the avoidance of onsite streams and minimal impacts to wetlands, minor runoff impacts expected to surface waters across the Project Site during construction, and the use of BMPs to prevent sedimentation, impacts to onsite jurisdictional waters would be insignificant. Figure 3-9 and Figure 3-10 depict the Project compared to Waters of the U.S. on the Project Site.

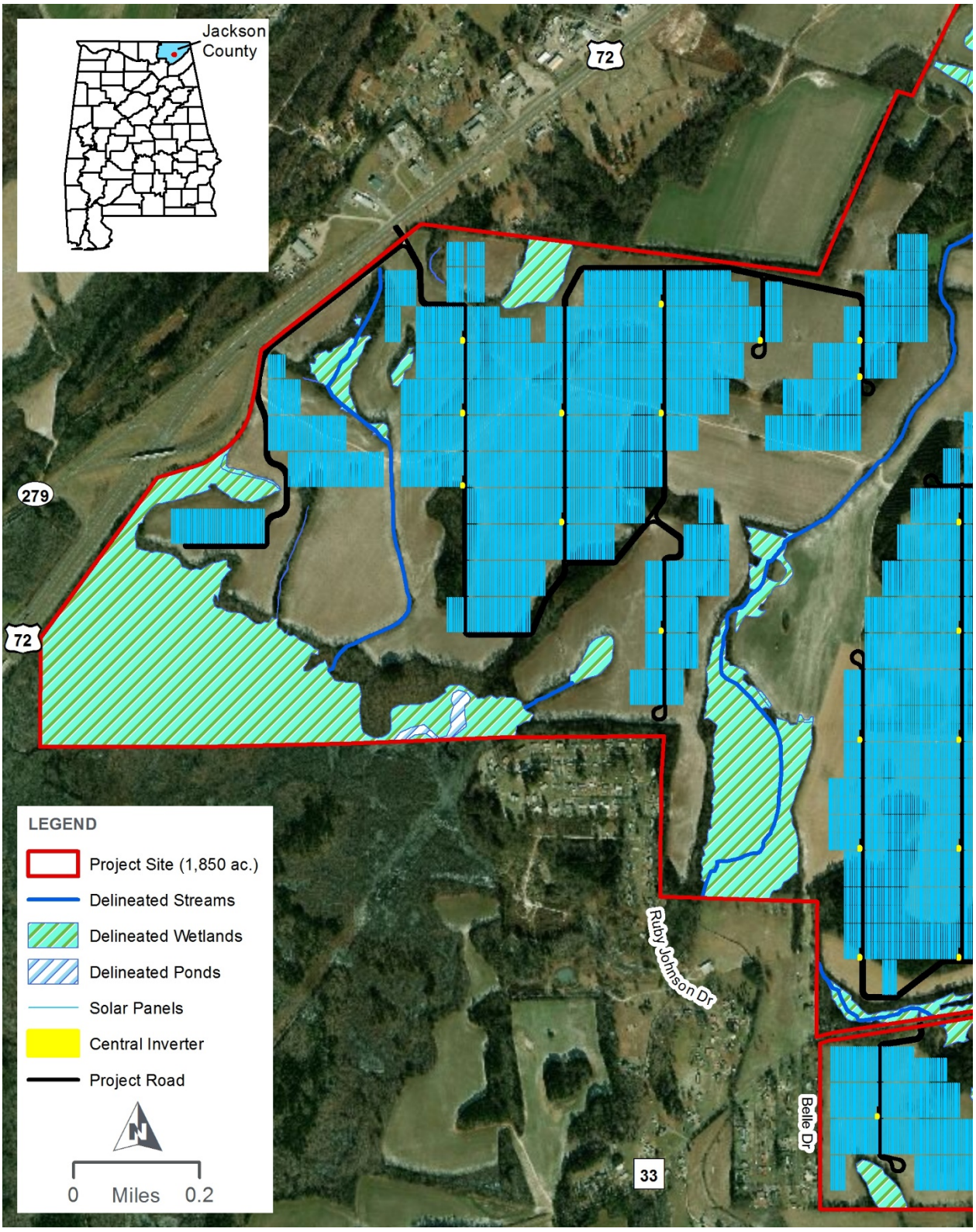

Figure 3-9. Proposed Project components in relation to Waters of the U.S. on the Project Site (West)

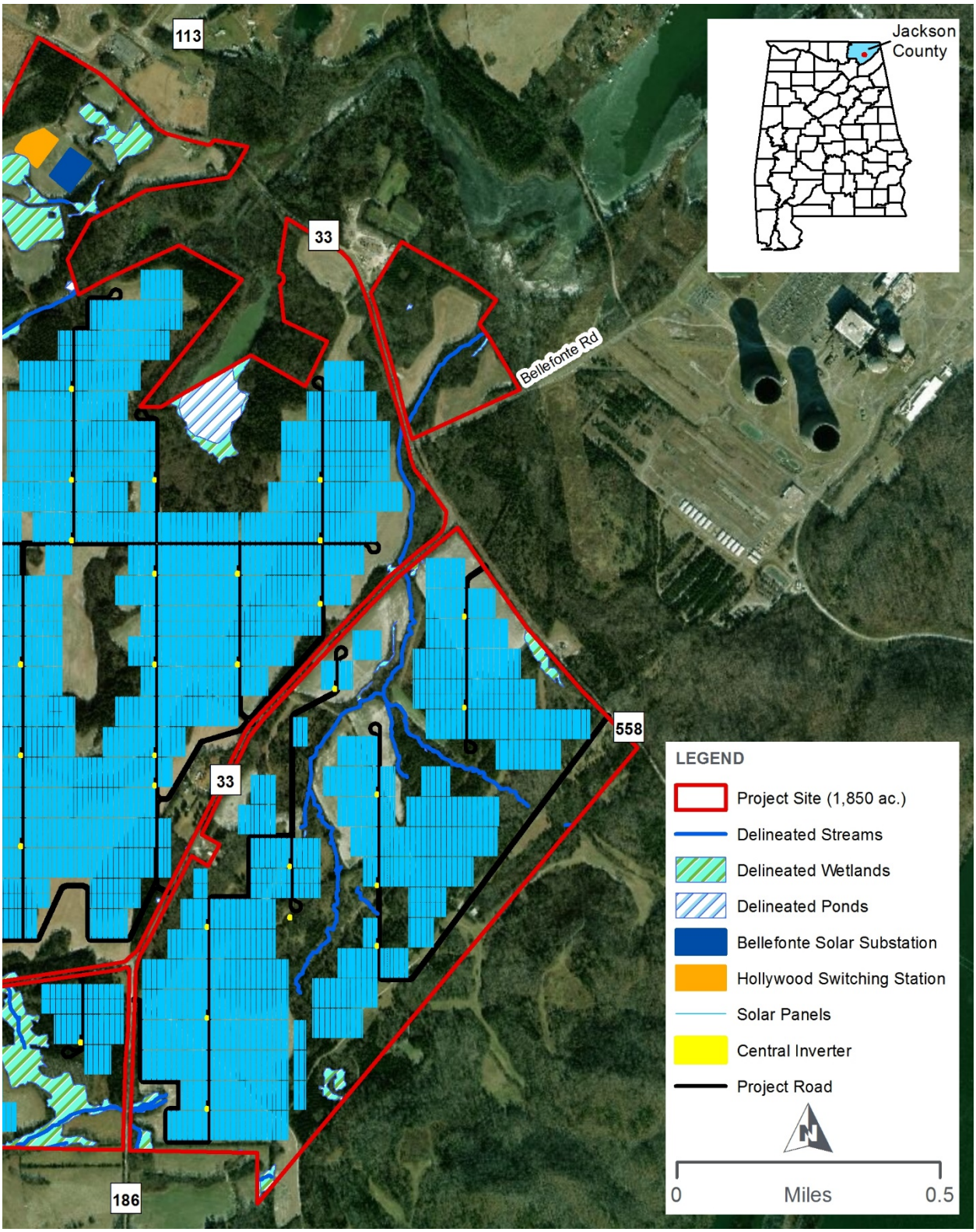

Figure 3-10. Proposed Project components in relation to Waters of the U.S. on the Project Site (East)

Floodplains

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "… to avoid to the extent possible the long- and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative…" The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. For certain "critical actions", the minimum floodplain of concern is the 500-year floodplain. Critical actions are actions for which even a slight chance of flooding would be too great, such as an emergency facility; therefore, the Proposed Action would not be considered a critical action.

TVA's Proposed Action would result in the construction and operation of the proposed solar facility by Bellefonte Solar, including construction of stormwater retention basins, the MPT for the solar facility, fencing, the Bellefonte Solar substation, the Hollywood switching station, access roads, installation of OPGW on an existing TL, minor grading for the solar panels, laydown areas for TVA Transmission and Bellefonte Solar, installation of temporary construction trailers, and tap line to connect the solar facility to the existing TVA transmission system.

The proposed solar facility, Bellefonte Solar Substation, tap line to the Project Substation, MPT, access roads, solar panels and light grading/clearing associated with them, and Hollywood Switching Station would be located outside of the 100-year floodplain. Project components, such as buried collection lines, security fencing, and portions of the overhead wire, may occur within the 100-year floodplain. Manual trimming of tall vegetation or tree limbs could also occur within 100-year floodplains. Consistent with EO 11988, the installation of underground electric lines and fencing are considered to be repetitive actions in the 100-year floodplain, which would result in minor impacts (TVA 1981). The exact locations of temporary stormwater basins and construction assembly areas are not known at this time; however, one or more could be constructed within 100-year floodplains, and would be analyzed in a subsequent environmental review. Figure 3-11 and Figure 3-12 depict the Project components in relation to floodplains on the Project Site.

By implementing standard BMPs and reviewing the temporary stormwater basins and construction assembly areas when they are known, the proposed solar installation, transmission line, and associated infrastructure would have no significant impact on floodplains and their natural and beneficial values.

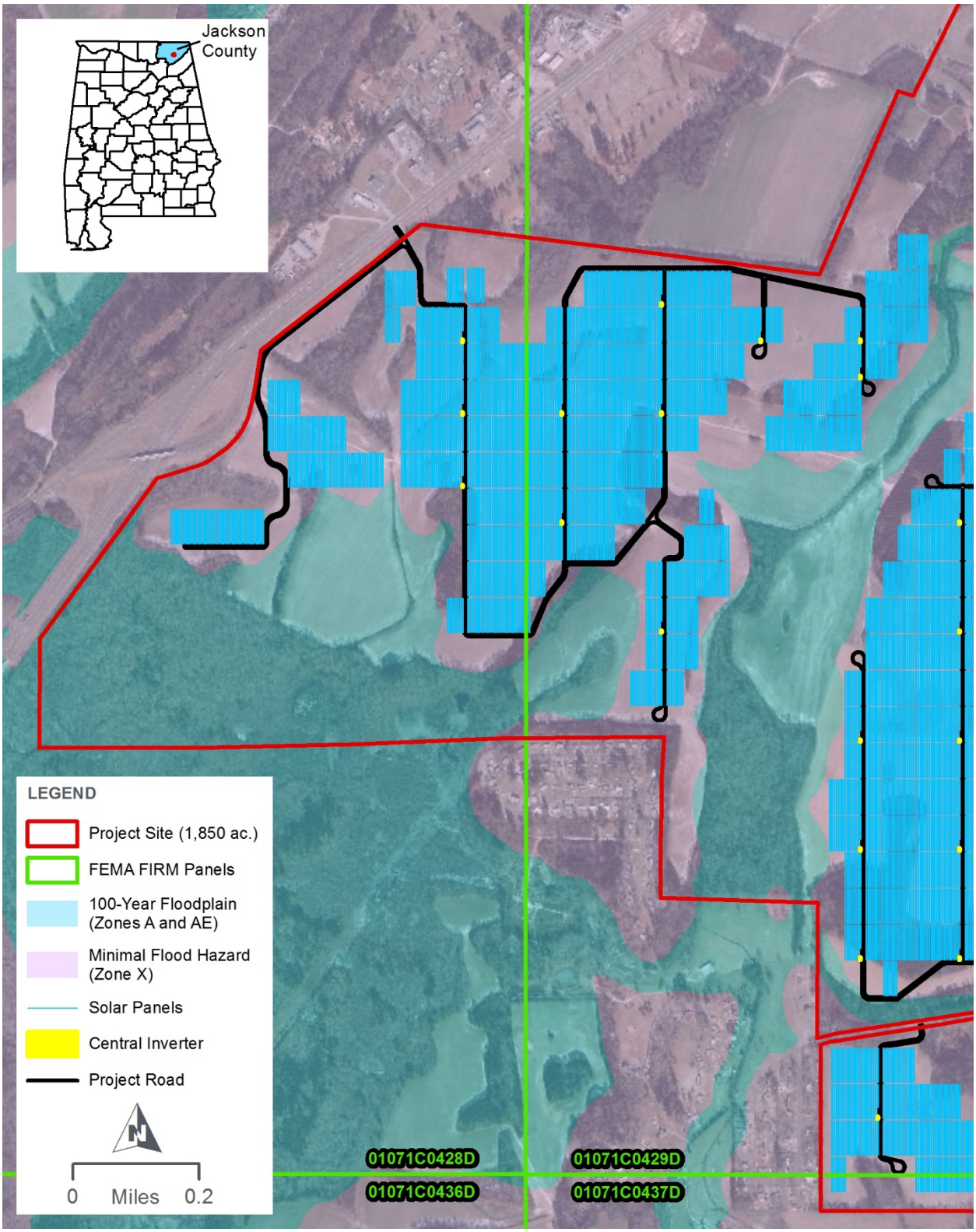

Figure 3-11. Proposed Project components in relation to floodplains on the Project Site (West)

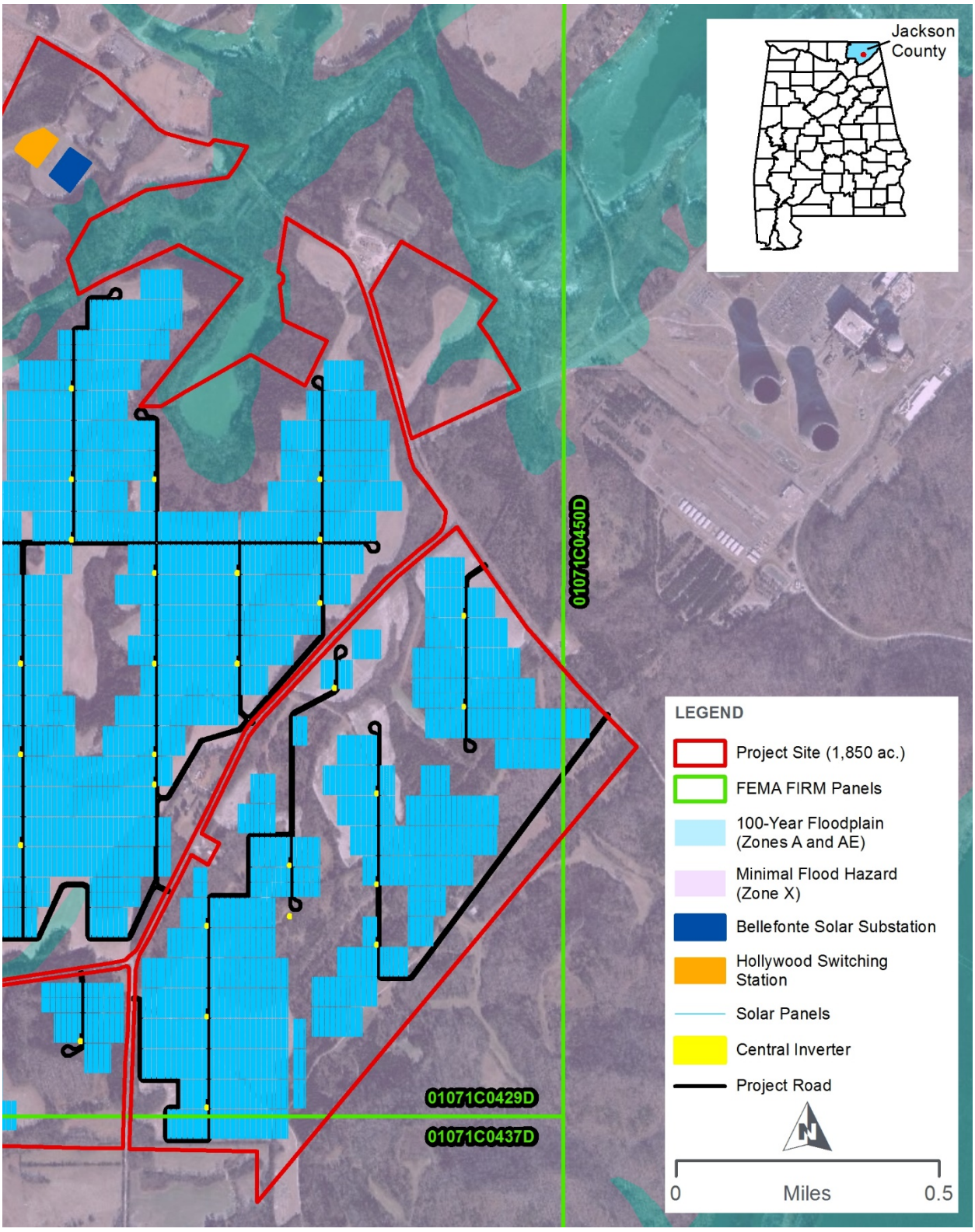

Figure 3-12. Proposed Project components in relation to floodplains on the Project Site (East)

3.4 BIOLOGICAL RESOURCES

This section describes the existing biological resources within the Project Site and the potential impacts to those resources that would be associated with the No Action and Proposed Action Alternatives. The components of biological resources analyzed below include natural areas, vegetation, wildlife, and rare, threatened, and endangered species.

The Project Area lies in the Southwestern Appalachians Level III Ecoregion, which contains six Level IV ecoregions (USFWS 2015a). The Project Site is located within the Sequatchie Valley sub-ecoregion, which is characterized by rolling hills and valleys at 600 feet in elevation. Agricultural products, pasture, hay, soybeans, small grain, corn, and tobacco are produced in large quantities in the Project Area and surrounding vicinity. Natural vegetation is comprised of mixed mesophytic forest (oak, elm, hickory, ash). The area experiences an average of 52 to 58 inches of precipitation per year, increasing to the south.

A desktop survey was performed prior to field investigations on the Project Site. Potential vegetation, wildlife, and threatened and endangered species were researched during the desktop survey, and habitat assessments were conducted by HDR biologists on February 18-21, 2019; March 25-29, 2019; and July 10, 2019. A bat habitat assessment was also conducted during these visits to assess and map potential for bat habitat on the Project Site. Results of the desktop survey and various field investigations are described in this section.

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

- Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544);
- Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. §§ 703-712) (for actions of non-federal entities);
- Executive Order for Migratory Birds (EO 13186 of January 10, 2001) (for actions of federal agencies);
- Bald and Golden Eagle Protection Act (BGEPA); and
- Administrative Code of Alabama Department of Conservation and Natural Resources (ADCNR), Chapter 220-4.

TVA provided lists from its Regional Natural Heritage Database (RNHD) of federally and state-listed species potentially occurring in Jackson County and/or within resources-defined radii of the Project Site or generally listed for the county. A USFWS Information for Planning and Consultation (IPaC) planning-level trust resources list was obtained to identify federally listed threatened and endangered species potentially occurring in the Project Area.

3.4.1 Affected Environment

Existing biological resources on the Project Site include natural areas, vegetation, and wildlife. Some rare, threatened, or endangered species also have the potential to occur in the Project Area.

3.4.1.1 Natural Areas

Natural areas include managed areas such as Wildlife Management Areas, National Wildlife Refuges and Habitat Protection Areas, ecologically significant sites, and river segments listed in the Nationwide Rivers Inventory. Three natural areas are known to exist within three miles of the Project Site (TVA 2019c): Bellefonte Island TVA Small Wild Area, Mud Creek Management Area, and Section Bluff TVA Small Wild Area. Bellefonte Island TVA Small Wild Area is a 105.1-acre tupelo gum swamp in the middle of the Tennessee River managed by TVA for waterfowl (TVA 1997). The Mud Creek Management Area, part of the Jackson County Wildlife Management Area (WMA), is an 8,003-acre natural area owned and managed by the ADCNR. This area is open for hunting of waterfowl and small game (ADCNR 2019a). Section Bluff TVA Small Wild Area is 509.9-acre natural area of sandstone outcrops and mature hardwoods which provides suitable habitat for threatened and endangered species.

3.4.1.2 Vegetation

Mixed mesophytic forests typical of the Sequatchie Valley Level IV ecoregion are characterized by oak, elm, hickory, ash, maple, blackgum, sweetgum, and beech. However, much of this ecoregion is in pasture. Approximately half (52 percent) of the Project Site has been cleared for farming or grazing, and the agricultural pasture portions of the Project Site are currently planted in a mix of corn, soybeans, and cotton. The Project Site contains approximately 844 acres of primarily deciduous forest (including wetlands), approximately 966 acres of agricultural land, and approximately 41 acres of open water and/or associated scrub/shrub vegetation. The forested areas are located primarily along field margins, along drainage ways, and slopes too steep to farm, and are even-aged stands of approximately 40 to 80 years in age.

Deciduous forested areas within the Project Site are characterized as mixed oak woodlands, which consist of white oak , southern red oak , water oak , willow oak , northern red oak , boxelder, red maple, American hornbeam, shagbark hickory, hackberry, cockspur hawthorne, green ash, sweetgum, tulip poplar, sycamore, black locust, black willow and American elm in the canopy layer. Evergreens such as eastern red cedar and loblolly pine were also documented. The Callery pear, an escaped ornamental and invasive species, was also documented within the tree layer of the Project Site.

The understory is composed primarily of red maple, mockernut hickory, hackberry, redbud, cockspur hawthorn, green ash, honey locust, eastern red cedar, sweetgum, willow oak, and winged elm. Non-native invasive species, including Chinese privet and multiflora rose, were observed in the forested areas of the Project Site. These invasive species were particularly prevalent in younger forests boarding the agriculture fields.

Vegetation observed in the scrub/shrub forest edges and field margins included species such as wild garlic, giant cane, trumpet creeper, hairy bittercress, lambs quarters, wild strawberry, stickwilly, soft rush, henbit deadnettle, Chinese privet, Japanese honeysuckle, butterweed, annual bluegrass, St. Anthony’s turnip, greenbrier, saw greenbrier, blackberry, goldenrod, poison ivy, corn speedwell and muscadine.

An uncommon limestone cedar glade plant community occurs on just over 2 acres within the proposed project footprint. Cedar glades are unique grasslands characterized by shallow soils underlain by limestone. These drought prone sites resist invasion of woody vegetation and support primarily herbaceous plant species. Herbaceous plants occurring in these unique habitats are often only found in association with glades and frequently include rare and uncommon species. Field surveys of this section of the parcel occurred in December 2019 when many plant species are not visible above ground, but characteristic plants observed within this habitat include little bluestem, Pitcher's stitchwort, poverty dropseed, prickly pear, roundseed St. Johnswort, Small's ragwort, Tall dropseed, and white wingstem. In addition to the relatively common species listed above, the state-listed plants gladecress and purpletassels were observed within the core of the cedar glade complex. Outside of this core area, the vegetation is disturbed and contains species indicative of disturbed habitats including tall fescue and sericea lespedeza.

3.4.1.3 Wildlife

Habitat assessments for terrestrial animal species were conducted on the Project Site during the field investigations in February, March, and July of 2019. The entire perimeter of the Project Area was walked with a focus on forest margins. Transects were walked across the farm fields. Each forested stand and water body was inspected, and streams and drainage features were followed throughout the Project Area. All of the vegetative community types described in the prior section offer suitable habitat for animal species common to the region, both seasonally and year-round. Individual species and/or evidence of species incidentally observed during field investigations are listed in the Wildlife and Vegetation Assessment Report (HDR 2019a; Appendix D).

Common mammals within the Southwestern Appalachians ecoregion include white-tailed deer, black bear, bobcat, gray fox, raccoon, mink, and gray squirrel (Kays and Wilson 2002). During the field investigations, white-tailed deer, coyote, raccoon, gray squirrel, red fox, eastern cottontail, and opossum were either physically observed or tracks/scat were present. Coyote carcasses and deer herds were seen in the agriculture areas, and tracks/scat were present throughout the Project Site. Evidence of raccoon, squirrel, fox, rabbit, and opossum were confined to the forested habitat.

Birds common to this ecoregion include wild turkey, bobwhite, mourning dove, red-eyed vireo, scarlet tanager, cardinal, and hooded warbler (Wilken et al. 2011). During field investigations, sharp-shinned hawk and red-tailed hawk were observed soaring over the agriculture fields/pasture. Killdeer, American woodcock, and wild turkey were seen in open fields and scrub/shrub along field boundaries. Three osprey nests were located on the transmission line that traverses the western side of the Project Site. Canada geese, mallards, and wood duck were observed in and near ponds and wetlands. Mourning dove were dispersed throughout the site.

Common reptiles native to the region include the northern copperhead, timber rattlesnake, midland water snake, brown snake, garter snake, snapping turtle, musk turtle, box turtle, fence lizard, and five-lined skink (Wilken et al. 2011; Conant and Collins 1998). A water snake and snapping turtle were observed in a pond in the northwest corner of the Project Site. In forested habitats with water features located in northeast Alabama, amphibians may include chorus frogs, cricket frogs, barking tree frog, bullfrogs, eastern spadefoot, American toad, marbled salamander,

spotted salamander, slimy salamander, dusky salamander, and red-spotted newt (Wilken et al. 2011; Conant and Collins 1998). Large numbers of spring peepers were heard in wetlands on the eastern and southwest portions of the Project Site at the time of the field investigation.

There are three caves known within 3 miles of the Proposed Action. Jackson County, Alabama, contains some of the most important hibernacula for federally listed bats. Additionally, the largest known Indiana bat hibernaculum in Alabama is located in Sauta Cave, approximately 8.3 miles from the Project Area (ACDNR 2019b). No caves or mines were identified on the Project Site during the field visits.

Migratory Birds

EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to further implement the MBTA. The MBTA prohibits the "take" of migratory birds. The regulatory definition of "take" as defined by 50 CFR § 10.12, means "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue hunt, shoot, wound, kill, trap, capture, or collect." The following prohibitions apply to migratory bird nests: "possession, sale, purchase, barter, transport, import and export, take, and collect." The MBTA is enforced by USFWS. Bellefonte Solar and its contractors would act in compliance with the MBTA.

The Project Site is located within the Bird Conservation Region 28 (BCR 248), Appalachian Mountains (NABCI 2019). There are 25 species of birds of conservation concern (BCC) in this region, including various species of songbirds, woodpeckers, owls, and raptors (USFWS 2008). According to IPaC, five migratory birds could inhabit the study area at a given time. The bald eagle (see section 3.4.1.4 for discussion), prairie warbler, wood thrush, red-headed woodpecker, and yellow-bellied sapsucker all have migratory patterns that may result in seasonal occurrences in the Project Area. Osprey were also added to this list as their presence was observed onsite (Table 3-2).

Table 3-2. Migratory bird species of concern potentially occurring on the Project Site

Common Name	Scientific Name	General Habitat Description	Habitat on Project Site?
Seasonal Migrants (may occur during only one season)			
Wood thrush	*Hylocichla mustelina*	Mature deciduous and mixed forests; most commonly those with American beech, sweet gum, red maple, black gum, eastern hemlock, flowering dogwood, American hornbeam, oaks, or pines	Yes
Red-headed woodpecker	*Melanerpes erythrocephalus*	Standing snags or hollow trees	Yes
Osprey	*Pandion haliaetus*	Nesting in tall structures either natural or manmade near medium to large bodies of water	Yes

Common Name	Scientific Name	General Habitat Description	Habitat on Project Site?
Prairie warbler	*Setophaga discolor*	Various shrubby habitats, including regenerating forests, open brushy fields, and Christmas-tree farms	Yes
Yellow-bellied sapsucker	*Sphyrapicus varius*	Mixed deciduous coniferous forests with snags and hollow trees.	Yes
Resident Species (may occur year-round)			
Bald eagle	*Haliaeetus leucocephalus*	Nesting in very tall trees or cliffs near medium to large rivers.	Yes

BCC are species not listed under the ESA but are a high conservation priority of the USFWS. Additionally, bald eagles are protected under the Bald and Golden Eagle Protection Act. Suitable habitat for some of these species may occur in forest edges and scrub/shrub portions on the Project Site. Some may also use agricultural or grassland habitats for foraging.

The prairie warbler is found in brushy early successional growth, particularly regenerating clear-cuts (ADCNR 2019f). Bottomlands and other rich hardwood forests are prime habitat for the wood thrush (NatureServe 2019). Red-headed woodpeckers are both non-migrant and locally migrant in the vicinity of the Project Area. Red-headed woodpeckers prefer standing snags or hollow trees. Most of their time spent foraging is around the ground to shrub canopy. They rarely drill into trees, and catch most of their prey in crevices (NatureServe 2019). The yellow-bellied sapsucker is the only locally occurring BCC that is not a summer resident; it is present from fall through spring and occupies a variety of forest types as well as wooded fencerows and residential areas (NatureServe 2019).

Fifteen known occurrences of osprey nests were identified on the TVA database search within three miles of the Project Area. During the field surveys, 12 osprey nests were observed in or near the Project Area. Osprey are a common species of least concern and frequent medium to large bodies of water. Osprey will nest in tall structures either natural or man-made. Based on information provided by TVA's biologist, the ospreys typically nest in this area between March 1st and July 31st.

A Colonial Wading Bird Colony was identified on the TVA database search (TVA 2019c) within three miles of the Project Area. The record was originally observed in 1974 and in 1999 a field survey was conducted and no nests or birds were found. Additionally, no nests, wading birds, or signs of wading bird colonies were observed during field surveys conducted in 2019.

3.4.1.4 Rare, Threatened, and Endangered Species

Threatened and endangered species are regulated by both federal and state governments. Database research provided by the USFWS IPaC lists federal threatened and endangered species data at the county level. An IPaC search identified three federally listed bats, one federally

listed mollusk, and one federally listed flowering plant as having potential to occur within the Project Area (Table 3-3; USFWS 2019).

The TVA Heritage Database (TVA 2019c) was also consulted to identify listed species having the potential to occur within specific buffers around the Project Area. A total of 61 state-listed species were identified. These species include two amphibian species, one insect species, one fish species, 22 mollusk species, and 35 plant species. Occurrences of nineteen mollusks and five plant species have been documented in Jackson County, Alabama and they were included in this analysis.

Federally Listed Species

Federally listed species identified during database research are shown in Table 3-3.

Table 3-3. Federally listed species in the Vicinity of the Project Area

Common Name	Scientific Name	Status	Preferred Habitat	Potential Habitat on Project Site
Mammals				
Indiana bat	*Myotis sodalis*	E	Spends winter hibernating in caves and mines, called hibernacula. Suitable summer tree-roosting bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with Potential Roost Trees (PRTs). A PRT has exfoliating bark, cracks, crevices or cavities that are greater than 5-inch diameter at breast height (DBH).	Yes
Northern long-eared bat	*Myotis septentrionalis*	T	Spends winter hibernating in caves and mines, called hibernacula. Suitable summer tree-roosting bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with PRTs. A PRT has exfoliating bark, cracks, crevices or cavities that are greater than 3-inch DBH.	Yes
Gray bat	*Myotis grisescens*	E	Roosts in caves year round. Various foraging habitats include wet meadows, damp woods, and uploads. Nearest known record is 3.6 miles west of the Project Site.	Yes
Bald eagle	*Haliaeetus leucocephalus*	DM	Tall, mature, coniferous or deciduous trees that afford a wide view of the surroundings are used as nest trees and roost trees. Suitable summer nesting habitat generally consists of prominent trees along riparian corridors on large bodies of water. Nearest known nest is 2.5 miles from the Project Site.	Yes
Mollusk				
Anthony's river snail	*Athearnia anthonyi*	E	Found at 4-6 meter depth (relatively uniform); mostly gravel substrate with some	No

Common Name	Scientific Name	Status	Preferred Habitat	Potential Habitat on Project Site
			sand, cobble, and boulders. Shallow, swift water.	
Dromedary pearlymussel	*Dromas dromas*	E	Clean, fast-flowing water in relatively firm rubble, gravel, and sand substrates free from siltation. Can survive up to 18 ft in depth	No
Snuffbox	*Epioblasma triquetra*	E	Lives in small to medium sized creeks with swift current.	No
Shiny Pigtoe Pearlymussel	*Fusconaia cor*	E	Moderate current with stream width of 10-15 meters and water depth of 1 meter in gravel and sand substrate.	No
Fine-rayed Pigtoe	*Fusconaia cuneolus*	E	Clear water, medium flow, gravel, silt and sand substrate.	No
Pink Mucket (pearlymussel)	*Lampsilis abrupta*	E	Species lives in large rivers with fast flowing water. No-suitable habitat onsite.	No
Alabama Lampmussel	*Lampsilis virescens*	E	Small headwater stream up to 10 meters in width, varying depth 0-1 meter. Substrate of sand and gravel, some cobble and boulders.	No
Palezone Shiner	*Notropis albizonatus*	E	In slow to moderate currents with coarse gravel substrate less than a meter in depth.	No
Ring Pink	*Obovaria retusa*	E	Large river species that has also been found in shallow waters within gravel and sandy substrates	No
Orange-foot pimpleback	*Plethobasus cooperianus*	E	Species lives in medium to large rivers. In Alabama, species only occurs in Colbert and Lauderdale Counties.	No
Sheepnose	*Plethobasus cyphyus*	E	Species is generally considered to be a large-river species and is usually reported within deep water.	No
Rough Pigtoe	*Pleurobema plenum*	E	Found in habitats varying from mud to sand, between rock ledges, rubble, and gravel substrates. Majority found in riverine systems in firm rubble free from siltation.	No
Slabside Pearlymussel	*Pleuronaia dolabelloides*	E	Medium flow, clear water, gravel, cobble, and silt substrate, and within riffle areas of sufficient velocities to remove finer sediments and provide well-oxygenated waters.	No
Rabbitsfoot	*Quadrula cylindrica*	T	Inhabits small to medium sized streams in shallow waters along bank adjacent to runs and shoals. May also occupy deeper water.	No
Smooth Rabbitsfoot	*Quadrula cylindrica cylindrica*	T	Medium flow, clear water, gravel, cobble, and sand substrate. Medium-large rivers, usually shallow waters but up to 3.7 meters in depth.	No
Winged mapleleaf	*Quadrula fragosa*	E	Species found in medium to large, high-quality streams with constant flow.	No

Common Name	Scientific Name	Status	Preferred Habitat	Potential Habitat on Project Site
Cumberland Monkeyface	*Quadrula intermedia*	E	Clean, fast-flowing water with firm rubble, gravel, and sand, free of siltation. Found buried in shallow riffle/shoal areas	No
Pale Lilliput	*Toxolasma cylindrellus*	E	Prefers strong to moderate current in small streams.	No
Cumberland Bean	*Villosa trabalis*	E	Clean, fast-flowing water with firm rubble, gravel, and sand, free of siltation. Found buried in shallow riffle/shoal areas	No
Plants				
Price's potato-bean	*Apios priceana*	T	Found in forest gaps in open, woody areas	No
American hart's-tongue fern	*Asplenium scolopendrium var. americanum*	T	Species grows on calcareous rocks near sinkholes in forested areas or limestone caves.	No
Morefield's leather flower	*Clematis morefieldii*	E	Inhabits limestone bluffs within open red cedar-hardwood forests and near springs, seeps, and ephemeral streams in rocky limestone woods.	No
White fringeless orchid	*Platanthera integrilabia*	T	Found in wet, boggy areas with acidic muck or sand, in partially shaded areas at the heads of streams or seeps.	No
Green pitcher plant	*Sarracenia oreophila*	E	Grows in sandstone streambanks, mixed oak or pine flatwoods, and seepage bogs where the soil is highly sandy and acidic.	No

E = Endangered; T = Threatened DM = Downlisted, in need of management

Mammals

Three species of federally listed mammals potentially occur on the Project Site: the gray bat, the northern long-eared bat (NLEB), and the Indiana bat. The gray bat prefers cave habitat year-round. Winter habitat for this species includes deep vertical caves with domed halls, and summer habitat includes warm caves with restricted ceiling access (USFWS 1997a). The Indiana bat and NLEB prefer winter habitats that include caves and mines (USFWS 2006; USFWS 2015b). During the summer, the Indiana bat and NLEB roost singly or in colonies underneath bark, in cavities, or crevices of both live and dead trees of varying size, age, and species (USFWS 2006; USFWS 2015b).

In February, March, and July 2019, HDR performed assessments of potential habitat for federally listed bat species on the Project Site and in TVA's proposed work areas along the existing TL. Forested areas were assessed for the presence of live trees that exhibit exfoliating bark and dead tree snags with cracks or crevices that could serve as suitable roost habitat. Photographs were also taken to visually document the assessment areas. A total of 23 stands were identified, 21 of which (totaling 834 acres) were determined to provide potential summer roost and forage habitat for the NLEB and Indiana bat. These stands were determined to have a habitat suitability greater than "Low", as shown in Table 3-4 below. The boundaries of potential suitable habitat were

mapped using a combination of aerial photography, GIS, and sub-meter GPS field mapping. Below is a summary of habitat assessment findings.

Table 3-4. Forest Stand Summary

Location	Stand Number	Habitat Suitability	Area (acres)
Project Site	Stand 1	Moderate to High	211.7
Project Site	Stand 2	Moderate	20.1
Project Site	Stand 3	Low	9.3
Project Site	Stand 4	Low	1.4
Project Site	Stand 5	Moderate	2.6
Project Site	Stand 6	Moderate	0.9
Project Site	Stand 7	Low to Moderate	0.1
Project Site	Stand 8	Low to Moderate	0.1
Project Site	Stand 9	Moderate	7.4
Project Site	Stand 10	High	179.0
Project Site	Stand 11	High	51.6
Project Site	Stand 12	High	91.1
Project Site	Stand 13	Moderate to High	267.7
Project Site	Stand 14	Moderate	0.1
Project Site	Stand 15	Low to Moderate	0.2
Project Site	Stand 16	Low to Moderate	0.1
Project Site	Stand 17	Low to Moderate	0.2
Project Site	Stand 18	Low to Moderate	0.3
Project Site	Stand 19	Low to Moderate	0.1
Project Site	Stand 20	Low to Moderate	0.1
Fiber Line	Stand AR01	Low to Moderate	0.5
Fiber Line	Stand AR02	Moderate to High	0.4
Fiber Line	Stand AR05	Moderate	0.2

No caves or mines are located on the Project Site; however there are three caves known within 3 miles of the proposed actions. Jackson County, Alabama, contains some of the most important hibernacula for federally listed bats. The largest known Indiana bat hibernaculum in Alabama is located in Sauta Cave, approximately 8.3 miles from the Project Area (ADCNR 2019b). Sauta Cave also hosts a very large summer gray bat colony and hibernating gray bats. The largest hibernaculum of gray bats in the United States is located in Fern Cave, approximately 19 miles from the Project Site (ADCNR 2019b). A cave also exists 9.4 miles away that contains mostly gray bats with records of NLEB and Indiana bats inhabiting it as well. There are two other gray bat records near the Project Site approximately 2.3 and 2.9 miles from the Project Site, though one record states the exact location is unknown and the other site is historical. One additional NLEB hibernacula is located within Jackson County (ADCNR 2019b), approximately 12.4 miles from the Project Site. Three hundred and ninety-two acres of suitable summer roost habitat for the Indiana bat and NLEB, consisting of trees of varying ages, including dead snags, is located on the Project Site. Adequate habitat for the gray bat is also present, as these bats travel long distances to forage and are seen throughout Jackson County.

Foraging habitat for all three bat species occurs over ponds, wetlands, and streams located on the Project Site. Additional foraging habitat for Indiana bat and NLEB occurs over forested habitat, forest edges, and tree lines on the Project Site and in TVA's proposed work areas along the existing TL.

Mollusks

According to IPaC, there is one federally listed mollusk species, the pink mucket, with the potential to occur in the Project Area (NatureServe 2019). This species is found in the mud and sand and in shallow riffles and shoals swept free of silt in major rivers and tributaries (USFWS 1997b). The pink mucket is associated with fast-flowing waters, but has been noted for its ability to survive and reproduce in impoundments with river-lake conditions, but not in standing pools of water (USFWS 1985) (NatureServe 2019). This mollusk buries itself in sand or gravel, with only the edge of its shell and its feeding siphons exposed (USFWS 1997b). None of the streams within the Project Area contains suitable habitat for the pink mucket.

An additional 19 fresh water mollusk species are known to occur in Jackson County. Generally, all of the listed species inhabit medium to large rivers with high flow rates, which increases food availability and reduces their susceptibility to sedimentation. The perennial streams within the Project Site are relatively small with low to moderate flow and do not contain suitable habitat for listed mollusk species.

Plants

One federally listed flowering plant species, Price's potato-bean, was identified on the IPaC (USFWS 2019). This species prefers open clearings in forests near stream bottoms. Populations can also be found in power line or road rights-of-way where there is ample light. This species is an herbaceous vine that can grow up to 15 feet through underground tubers. Greenish-pink flowers are produced in June-July. There are 15 extant populations known to exist in Alabama in seven counties. The preferred habitat for this species includes open, rocky, wooded slopes and floodplain edges under mixed hardwoods or in associated forest clearings, often where bluffs or ravine slopes meet creek or river bottoms. Since the preferred habitat is not located within the Project Area, the Project will have no effect on Price's potato-bean (NatureServe 2019).

Four additional federally listed plant species are known to occur within Jackson County; American hart's-tongue fern, Morefield's leather flower, White fringeless orchid, and Green pitcher plant. Habitat to support populations of these federally listed species does not occur within the Project Site.

State-Listed Species

State-listed species identified during database research and field surveys that have the potential to utilize the Project Area but are not federally listed species are shown in Table 3-5. These consist of two amphibians, one fish, one insect, four mollusks, and 33 plant species that have a state status or rank.

Table 3-5. State-listed species potentially occurring within the Project Site

Common Name	Scientific Name	Rank/ Status	Preferred Habitat	Habitat present on Project Site
Amphibians				
Green salamander	*Aneides aeneus*	S3/SP	Habitats include damp rock crevices, shaded rock outcrops/ledges, as well as fallen trees and/or loose bark and cracks of standing trees adjacent to cliffs.	No
Ocoee salamander	*Desmognathus ocoee*	S2	Habitats include bogs, fens, riparian areas, conifer, mature hardwood, and mixed forests. Habitat ranges from low gorges to high mountaintops.	No
Fish				
Southern cave fish	*Typhlichthys subterraneus*	S3/SP	Freshwater species known to typically inhabit cool, clear waters of cave streams, underwater lakes, wells, and outlets of springs over mixed gravel, sand and mud substrates.	No
Insects				
Cave obligate spider	*Nesticus barri*	S3	Caves	No
Mollusks				
Butterfly mussel	*Ellipsaria lineolata*	S4	Prefers large rivers with pronounced current and a substrate of course sand and gravel.	No
Ohio pigtoe	*Pleurobema cordatum*	S2	Found in large and medium rivers and some reservoirs but appears to require flowing water.	No
Pyramid pigtoe	*Pluerobema rubrum*	S1	Inhabits large rivers, but may be found in medium rivers. Prefers moderate to swift currents.	No
Monkeyface	*Quadrula metanevra*	S3	Found in large or medium rivers with gravel and/or sand bottom.	No
Plants				
Shining indigo-bush	*Amorpha nitens*	S1	Forests on exposed limestone talus slope in ephemeral drains or next to streams.	No
Canadian milkvetch	*Astragalus Canadensis*	S1	Small limestone glades on edge of forest near power line structures.	No
Nuttall's rayless golden-rod	*Bigelowia nuttallii*	S3	In soils in shallow depressions, in sandstone and siltstone substrates, sand, sandy-loam.	No
Purple sedge	*Carex purpurifera*	S2	Found in rich, moist shaded soils along drainage; in woods over limestone.	No

Common Name	Scientific Name	Rank/ Status	Preferred Habitat	Habitat present on Project Site
Wister's coral-root	*Corallorhiza wisteriana*	S2	Occurs in rich hardwood forests.	No
Woodland tickseed	*Coreopsis pulchra*	S2	Found in deeper, shaded soils around margin of sandstone outcrop. Depends on seepage of moisture across the outcrop from adjacent forested areas.	No
American smoke-tree	*Cotinus obovatus*	S2	Found on limestone outcrops in deciduous forests.	No
Harper's dodder	*Cuscuta harperi*	S2	Found in sandstone outcrops.	No
Tennessee bladderfern	*Cystoperis tennesseensis*	S2	Grows on cliffs, ledges, cracks, can be on man-made substrate and/or calcareous substrate.	No
Purple tassels	*Dalea gattingeri*	S3	Grows in limestone cedar glades.	Yes
Dutchman's breeches	*Dicentra cucullaria*	S2	Grows in forests on exposed limestone talus slopes near reservoirs. Found in deciduous woods and clearings in rich loam soils.	No
Creeping aster	*Eurybia surculosa*	S1	Found in sandy and gravel soils in open areas, pinelands, oak-scrub, clearings, and roadsides.	No
White-leaved sunflower	*Helianthus glaucophyllus*	SH	Found in woodland edges and on steep slopes, prefers sandy loam and elevations about 750m, possibly extirpated from Jackson County.	No
Longleaf sunflower	*Helianthus longifolius*	S1S2	Found around edges of sandstone glades and in open right-of-ways. Mostly associated with shallow soils and granite outcrop edges.	No
Goldenseal	*Hydrastis canadensis*	S2	Found in hardwood forests with calcareous soils.	No
Butler's quillwort	*Isoetes butleri*	S2	Grows on limestone outcrops or calcareous soils in cedar glades.	Yes
Twinleaf	*Jeffersonia diphylla*	S2	In habits rich hardwood forests with oaks.	No
Michaux's leavenworthia	*Leavenworthia uniflora*	S2	Grows on rocky ledges, cedar glades, pastures, roadsides, old fields, thin limestone beds, and seeps on limestone.	Yes
Alabama snow-wreath	*Neviusia alabamensis*	S2	Grows on forested bluffs, talus slopes and streambanks typically on thin soils over limestone.	No
One-flowered broomrape	*Orobanche uniflora*	S2	Inhabits hardwood forests with oaks.	No
Great yellow wood-sorrel	*Oxalis grandis*	S1	Inhabits sandy woods, alluvial soils.	No
American ginseng	*Panax quinquefolius*	-	Hardwood or mixed forests on steep slopes usually over limestone or marble parent material with good soil humus.	No

Common Name	Scientific Name	Rank/ Status	Preferred Habitat	Habitat present on Project Site
Tennessee leafcup	*Polymnia laevigata*	S2S3	Grows in shaded mixed mesophytic forests on moist loamy and rocky substrate.	No
Spotted mandarin	*Prosartes maculata*	S1	In habits rocky mature hardwood forested slopes, ravines, or dry ridge crests.	No
Granite gooseberry	*Ribes curvatum*	S2	Grows on dry, rocky slopes and in rich woods.	No
Prickly gooseberry	*Ribes cynosbati*	S1S2	Found in rich hardwoods and conifer-hardwoods, rocky slopes, bounder fields, heath balds in cooler climates.	No
Sunnybell	*Schoenolirion croceum*	S2	Rock outcrops and moist pinelands.	No
Spikemoss	*Selaginella arenicola ssp. riddellii*	S2	Grows in sandstone and dry soils.	No
Cumberland rosinweed	*Silphium brachiatum*	S2	Found on roadsides, power line right-of-ways and previously disturbed forests. Requires calcareous soil with exposed limestone bedrock, dry soil, and partially shaded forest openings.	No
Southern red trillium	*Trillium sulcatum*	S1	Found in rich hardwood forests, mainly moist north or east facing slopes, wooded ledges, and/or stream banks with neutral or slightly acidic soil.	No
Horse-gentian	*Triosteum angustifolium*	S1	Inhabits upland rocky deciduous woods. The single Jackson County occurrence not seen since 1933.	No
Canada violet	*Viola canadensis*	S2	Inhabits moist, open wooded areas.	No

S1= Critically imperiled, S2= Imperiled, S3-Vulnerable, SH= Historical Occurrence, SP= State Protected

Amphibians

The TVA Heritage Database identified two state-listed amphibians within three miles of the Project Site: the green salamander and Ocoee salamander. The green salamander can be found in northeastern Alabama in crevices in cliff faces, rock outcrops, and caves in shaded, mesic hardwood forests adjacent to cliffs (ADCNR 2019c). The species inhabits moist, but not permanently wet, crevices and may be found under fallen tree bark or in rotting logs and stumps (ADCNR 2019c). There does not appear to be suitable habitat for the green salamander within the Project Area, as cliff faces and rocky crevices are absent. The closest record of this species is across the Tennessee River along sandstone bluffs, approximately 2.3 miles from the Project.

The Ocoee salamander is known to be present in only a few locations in northeastern Alabama in Jackson and DeKalb counties and prefers wet areas with moist substrates, most commonly around small streams and seeps (ADCNR 2019d). Despite being more terrestrial than some other members of its genus and occasionally found in moist, mature forests far from water, moisture is always a key requirement for this species (ADCNR 2019d). The Ocoee salamander may also be

found in and around crevices on wet, shaded cliffs (Huheey and Brandon 1973). Individual salamanders are most often encountered under rock cover or beneath/within fallen logs, occasionally occurring in moss mats on the forest floor. Individuals emerge from cover at night to forage (ADCNR 2019d). Since Ocoee salamanders require mature forest and healthy stream habitats with abundant moisture, undeveloped or unaltered habitat types across the extent of their range in Alabama are limited (ADCNR 2019d). Though the database search revealed Ocoee salamanders have been reported approximately 2.4 miles from the Project Site, these records are from the 1960's on the Cumberland Plateau Escarpment slope across the Tennessee River. Suitable habitat for this species does not occur on the Project Site.

Insects

One state-listed insect species was listed within three miles of the Project Area. This species is not likely to be present on the Project Site since *N. barri* is a cave obligate spider. No caves occur in the Project Site and no records of caves exist within 2.5 miles of the Project Site.

Fish

One state-listed fish species, the southern cave fish, has the potential to occur on the Project Site. In Alabama, southern cave fishes are found in limestone cave environments in the Tennessee River drainage and in subterranean waters of the Coosa River system. Southern cavefishes occupy clear, mud-bottomed pools and flowing pools of limestone caves (ADCNR 2019e). This species prefers the presence of a permanently effluent spring, either one that discharges at the surface into a spring pool or one that contributes to a cave stream or the filling of a sinkhole (Noltie and Wick 2001). Although a sinkhole has been identified, there are no confirmed limestone caves within the Project Site. The presence of the southern cavefish within the Project Site is unlikely because of the lack of suitable habitat.

Mollusks

There are four state-listed mollusk species that have the potential to occur on the Project Site. The perennial streams on the Project Site are too small, too low gradient, and exhibit flows too low to support the butterfly mussel, Ohio pigtoe, pyramid pigtoe, or monkeyface. Therefore, suitable habitat does not exist for these species on the Project Site.

Plants

Thirty-four state-listed plant species (five of which are also federally listed) were included in the results of the TVA Heritage Database search as potentially occurring within five miles of the Project Area. An uncommon limestone cedar glade plant community occurs on just over 2 acres within the proposed project footprint. These glades provide suitable habitat for three state-listed species within the Project Area: Michaux's leavenworthia, Butler's quillwort, and Purple tassels (Figure 3-13).

Two plant species listed by the state of Alabama were observed growing in association with the limestone glade situated southeast of Cedar Glade Church. The first species, a gladecress (*Leavenworthia* sp.), is a small winter annual that germinates in the fall, grows through the winter

and early spring, and flowers and sets seed from March into May. This species inhabits shallow, seasonally inundated soil that support few other species. Michaux's gladecress has been previously collected from very near this location in the spring of 1984, but has not been observed since. The gladecress observed on the Bellefonte solar site could not be definitively identified because the plants were very small during the December field survey; all species of *Leavenworthia*, however, are state-listed in Alabama. Hundreds to thousands of the diminutive plants were observed in gravelly soils of the cedar glade complex. The vast majority of these individuals will flower the following spring.

Another cedar glade endemic, purple tassels (*Dalea gattingeri*), was observed growing in cracks of limestone bedrock. This extremely drought tolerant perennial species forms a large tuber-like root that allows the plant to inhabit the thinnest of soils in the interior of glades. This species has never been reported from Jackson County, Alabama. Only a handful of individuals were observed, but the December survey season made discerning the plant difficult because the species had mostly died back for the year. More individuals likely occur onsite.

Butler's quillwort, a fern-like plant of cedar glades, was reported near Cedar Glade Church in 1988. Only a handful of plants were seen at that time. The species was not observed within the glade during the December field survey, but habitat is present. Given the survey season it is not possible to determine if the species is present within the mapped cedar glade complex, but the species does require specific habitat that is not present in other portions of the project footprint.

Though the database search identified 31 species within five miles of the Project Site, the majority of those occurrences have only been documented on the Cumberland Plateau Escarpment slopes across the Tennessee River. Therefore, suitable habitat does not exist within the Project Area for the following state-listed plants: American smoke-tree, Tennessee bladderfern, white-leaved sunflower, spotted mandarin, granite gooseberry, prickly gooseberry, spikemoss, great yellow wood sorrel, horse-gentian, Canada violet, Harper's dodder, longleaf sunflower, sunnybell, shining indigo-bush, Canadian milkvetch, Dutchman's breeches, purple sedge, wister coral-root, goldenseal, twinleaf, Alabama snow-wreath, Southern red trillium, woodland tickseed, Tennessee leafcup, one-flowered broomrape, creeping aster, Cumberland rosinweed, and Nuttall's rayless golden-rod (NatureServe 2019) (AHC & UWA 2019) (eFloras 2019).

American ginseng was listed in the TVA database but is not a federally or state-listed species. However, the species has experienced population decline due to overharvesting. The species inhabits wooded areas under closed canopy on slopes or ravines, often over limestone parent material (NatureServe 2019) (AHC & UWA 2019) (eFloras 2019). There is no suitable habitat on the Project Site.

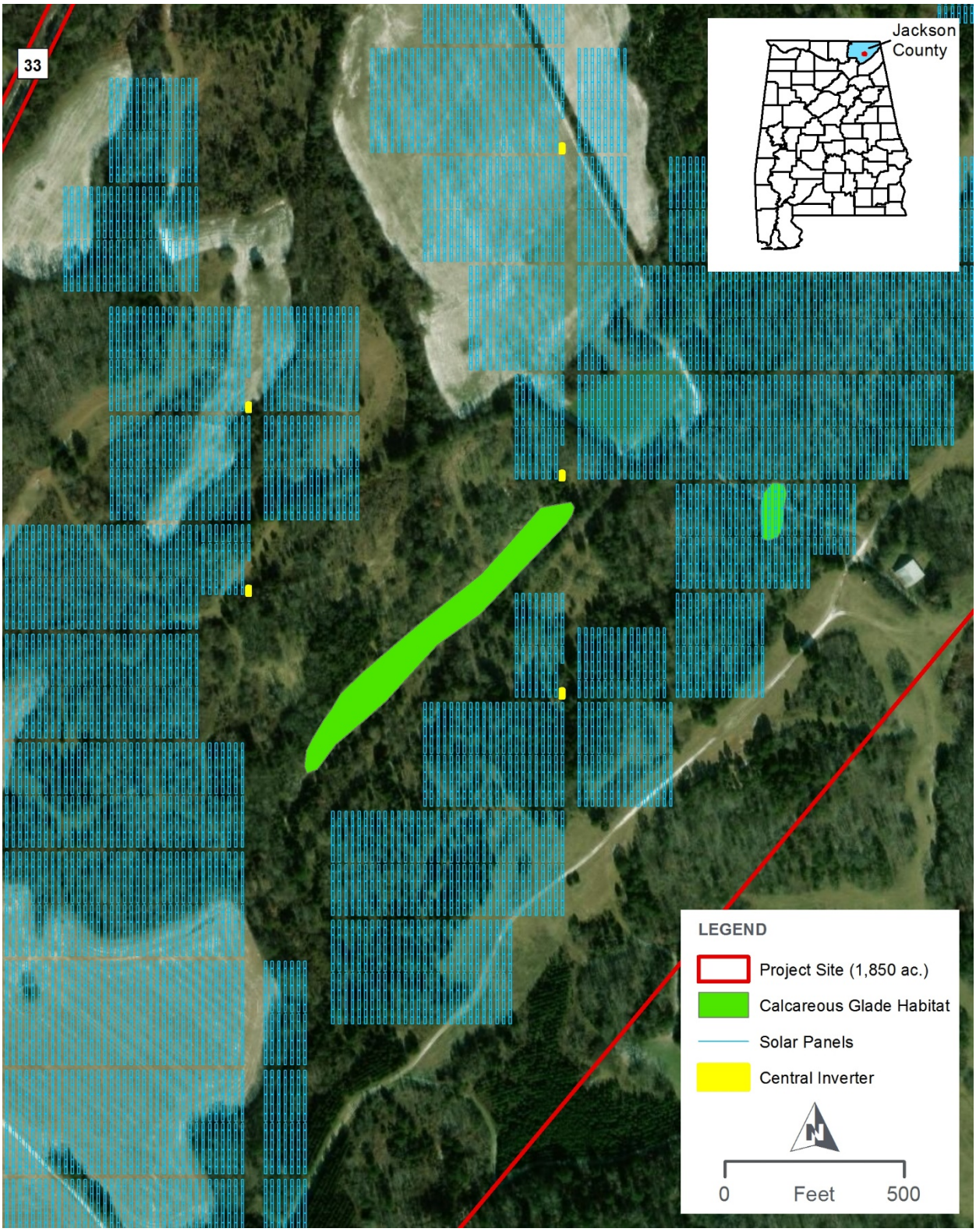

Figure 3-13. Suitable glade habitat for Michaux's leavenworthia, Butler's quillwort, and Purple tassels

Bald and Golden Eagle Protection Act

Both bald and golden eagles are protected by the MBTA and the Bald and Golden Eagle Protection Act of 1940 (BGEPA, 16 U.S.C. 668-668d). Under the BGEPA, it is illegal to kill, harass, possess (without a permit), or sell bald and golden eagles and their parts.

Bald eagles typically utilize forested areas adjacent to large bodies of water for nesting habitat. Tall, mature, coniferous or deciduous trees that afford a wide view of the surroundings are used as nest trees and roost trees. Bald eagles typically avoid heavily developed areas. Suitable summer nesting habitat for bald eagles generally consists of prominent trees along riparian corridors on large bodies of water. A bald eagle nest occurs 2.5 miles from the Project Site. Some large trees that may meet the needs for a nest or roost site occur on the Project Site, and Guntersville Reservoir is located less than 0.5 mile from the site. However, no bald eagles or bald eagle nests were observed during the field investigations, though a bald eagle could potentially occur in or pass through the Project Site.

Golden eagles occur as rare winter residents in Alabama. The Project Site encompasses suitable winter roosting and foraging habitat. Therefore, while the species is rare in the region, the golden eagle could potentially occur in or pass through the Project Site.

3.4.2 Environmental Consequences

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

3.4.2.1 No Action Alternative

Natural Areas

Under the No Action Alternative, there would be no Project-related impacts to the three known natural areas located within three miles of the Project Site. It is assumed the areas would continue to be managed as they are currently.

Vegetation

Under the No Action Alternative, there would be no Project-related impacts to the existing vegetation in the Project Area, and existing agricultural areas would likely remain in agricultural production. Over time, it is possible that the open-field areas and the cedar glade habitat on the Project Site could become developed, and the forested areas could become cleared if the resident population in the area increases or land uses change.

Wildlife

Under the No Action Alternative, there would be limited impacts to wildlife in the Project Area. Existing land use would remain as a mix of agricultural, developed, and undeveloped land. The agricultural fields on site would be expected to continue to be regularly used, limiting their use by wildlife.

Rare, Threatened, and Endangered Species

Under the No Action Alternative, no Project-related impacts to rare, threatened, and endangered species would be anticipated because habitat for listed species is either absent from the Project Site or would not be impacted under the No Action Alternative.

3.4.2.2 Proposed Action Alternative

Under the Proposed Action, direct impacts to vegetation and wildlife may result from construction and operation of the Project.

Natural Areas

The Proposed Action is not anticipated to have any impacts on the biological resources associated with Bellefonte Island TVA Small Wild Area, Mud Creek Management Area, and Section Bluff TVA Small Wild Area, given the nature of the activities and the distance from the Project Site to the natural areas.

Vegetation

Under the Proposed Action, construction and operation of the solar facility would have direct adverse impacts to vegetation. Over half (434 acres) of the forested area located within the 1,850-acre Project Site would be cleared for grading and to prevent shading of the solar arrays. Aside from non-mechanized clearing of tall vegetation that would block solar panels, forested stands that will remain undisturbed include biologically-sensitive areas associated with jurisdictional streams and wetlands. TVA's proposed work along the existing TL would require minimal tree clearing and is expected to be limited to small trees and limb trimming along existing access roads and around some of the new structures that would be constructed.

Following construction, disturbed portions of the Project Site would be seeded with native grasses and/or noninvasive vegetation, and the site would be maintained to prevent vegetation from growing taller than 18 inches, as described in Section 2.2.3.

Invasive species on the Project Site would be removed or graded and cleared during construction and managed with selective herbicides as needed during operations. To minimize the introduction and spread of invasive species, standard operating procedures would be consistent with EO 13112 (Invasive Species) for revegetating with noninvasive plant species. It is likely that construction of the Project would result in localized increases of invasive plants, but the plants most likely to colonize the area are distributed widely throughout the region. Effects would be further reduced because revegetation of the site would be accomplished using native and/or noninvasive species. The Project would not significantly contribute to the spread or introduction of plants.

Approximately 434 acres of forested land, constituting approximately 51 percent of the land to be developed for the solar facility, would be cleared for placement of Project components or to prevent shading of solar panels. Project components would not be constructed within a 50- to 60-foot buffer of the jurisdictional streams and wetlands, and the buffer area would generally be avoided during construction, as described in Section 2.2.2. Tree removal associated with the

Project would be minimized to the extent possible, particularly to the north of proposed components, as trees in this vicinity would not shade the solar panels.

An uncommon limestone cedar glade plant community occurs on just over 2 acres within the proposed project footprint. Cedar glade habitat is sporadic and uncommon in northeastern Alabama. This plant community supports a unique assemblage of plants and has standalone conservation value. The vast majority of the cedar glade habitat present within the action area is not located in areas where panels would be installed and would not need to be disturbed during construction and operation of the facility. Temporary fencing would be installed during construction to exclude vehicles and construction equipment from the majority of the delineated cedar glade habitat. Post-construction, this portion of the habitat would remain undeveloped to protect the plant communities present. This commitment would be recorded on the engineering drawing for the site. With implementation of the above commitment, impacts to cedar glade habitats resulting from the Proposed Action Alternative would be long-term, but minor and insignificant.

With respect to the overall Project Site vegetation and taking into consideration the large amount of similar vegetation types in the area regionally and locally, clearing the existing vegetation and light grading would be considered minor impacts. The surrounding area consists of similar vegetation communities and the effects of the conversion of portions of the Project Site in this context would be relatively small.

Wildlife

Under the Proposed Action, the proposed solar facility may be constructed with direct impacts to certain types of wildlife habitat. Approximately 434 acres of forest habitat would be cleared in order to develop the proposed solar facility. The areas along the northern, eastern, and southwestern boundaries of the Project Site are relatively undisturbed, mature forests. Within the agricultural areas, the forest generally occurs in linear strips along field borders or streams and in small patches, which contain more nonnative species. The removal of forested habitat from the site would have direct and indirect effects on common wildlife species that utilize wooded habitat on the site. This would result in the temporary to long-term displacement of any wildlife (primarily common native or naturalized species) using the area. Direct effects to some individuals may occur if those individuals are immobile during the time of vegetation removal (i.e., hibernating, pups, nestlings, eggs, larvae). Most of the forest proposed for removal (approximately 392 acres) would be removed in winter months when most common species of wildlife are not breeding/nesting. Those individuals not in hibernation are expected to flee when disturbed.

Habitat loss may disperse mobile wildlife into surrounding areas in an attempt to find new food and shelter sources and to reestablish territories. Considering the amount of similar quality habitat in the surrounding landscape, it is unlikely that any populations of wildlife species would be unable to relocate successfully. Therefore, the Project would have minor impacts on populations of common wildlife species.

Migratory Birds

Potential grassland/pasture, forest, forest edge, and bottomland habitat is present for the migratory birds that may occur in the Project Area. The Project would establish 50-foot buffers surrounding most wetlands and maintain the existing vegetation.

Although the installation of Project components may reduce the foraging potential on the Project Site, the Project is not anticipated to have significant effects on migratory birds of conservation concern that require open country with scattered trees and shrubs, such as the prairie warbler and red-headed woodpecker. Tree removal is proposed during winter months (November 15-March 31) when neither of these species would be breeding. Therefore it is assumed that any individuals present would be able to flush to adjacent lands if disturbed. Similar habitat type is available adjacent to the Project Site and would likely absorb any displaced individuals.

The Project would have minimal impact on mature, deep, and shady bottomland forests, as impacts to those forests located in the southwest and the north would be avoided. Mature forests provide habitat for species such as the wood thrush and yellow-bellied sapsucker. With the seasonal tree removal mentioned above and the limited amount of habitat suitable for these species that would be impacted, proposed actions are not likely to significantly affect these species.

Twelve osprey nests and two heron rookeries have been reported near or within the Project Site. Activities occurring within 660 feet of these nests will be limited to the non-nesting season where feasible. If disturbing actions are proposed within 660 feet of active osprey nests, USDA-APHIS will be contacted for guidance to ensure compliance with all applicable laws protecting osprey.

Rare, Threatened and Endangered Species

Federally Listed Species

Suitable habitat is present in the Project Area for three federally listed mammal species: Indiana bat, NLEB, and gray bat.

Foraging habitat for Indiana bat, NLEB, and gray bat occurs over ponds, wetlands, and streams located in the Project Area. Suitable summer roosting habitat is also present in the forested areas for Indiana bat and NLEB. Approximately 392 acres of forested area that provides summer roosting habitat for Indiana bats and NLEBs would be cleared, including Stands 1, 2, 5, 6, 9, 10, 11, 12, 13, 17, 18, AR01, AR02 and AR05. Efforts will be made to minimize clearing of these areas as refinement of future design allows, and any clearing activities will take place between November 15 and March 31 to minimize any potential impact to bat populations. Additional clearing outside of the stands noted above will occur in areas that include tall vegetation but do not include potential bat habitat, i.e., scrub/shrub. Appendix A, Figure 7 of the Wildlife and Vegetation Assessment outlines the areas which are expected to be cleared (HDR 2019a). TVA determined that the Project may affect but is not likely to adversely affect federally listed bat species. In compliance with Section 7 of the ESA, TVA consulted with USFWS on the potential effects of the Proposed Action on federally listed bat species, and USFWS concurred with the TVA determination in a letter dated January 30, 2020 (Appendix D). Though potentially suitable

summer roosting and foraging habitat is present, hibernacula and maternity roosts are not known onsite. In addition to the above mentioned mammal species, occurrences of nineteen mollusks and five plant species have been documented in Jackson County, Alabama. However, suitable habitat is not present on the Project Site, therefore no impacts are anticipated.

State-listed Species

A total of 61 state-listed species were identified to occur within Jackson County, Alabama. These species include two amphibian species, one insect species, one fish species, 22 mollusk species, and 35 plant species. Suitable habitat for the insect, fish, mollusk, and 32 plant species is not present within the Project Site; therefore, the proposed project would not impact these species.

An uncommon limestone cedar glade plant community occurs on just over 2 acres within the proposed project footprint. These glades provide suitable habitat for three state-listed plant species within the Project Area: Michaux's leavenworthia, Butler's quillwort, and purple tassels.

The state-listed species of gladecress was observed at several locations across the action area, but populations were concentrated within areas delineated as cedar glade habitat. Purple tassels habitat is more restricted than gladecress, and the species is unlikely to occur outside of the mapped cedar glade where it is was observed. Butler's quillwort was not seen during field surveys, but if the species is present it would occur only within mapped glade habitat. As previously mentioned, temporary fencing would be installed during construction to exclude vehicles and construction equipment from the majority of the delineated cedar glade habitat. Post-construction, this portion of the habitat would remain undeveloped to protect the plant communities present. This commitment would be recorded on the engineering drawing for the site.

With implementation of the above commitment, the vast majority of the habitat for state-listed species known from the site, along with others that might be present, would be protected from disturbance resulting from construction and operation of the solar facility. Implementation of the Proposed Action Alternative would impact approximately 0.21 acre of cedar glade habitat resulting in long-term minor impacts to state-listed species, but the impacts would not be significant.

Bald and Golden Eagles

Some large trees that may meet the needs for a bald eagle nest or roost site occur within the Project Area, and Guntersville Lake is within 5 miles of the Project Site. However, bald eagles are unlikely to nest or forage on the Project Site due to the relative distance to large water bodies and the existence of substantial interceding forested areas. Proposed actions are in compliance with the National Bald Eagle Management Guidelines. The Project would not significantly impact bald eagles.

The Project Site encompasses suitable winter roosting and foraging habitat for golden eagles. However, due to the rarity of golden eagles in the region and the availability of suitable roosting and foraging in nearby similar habitat, the Project is not expected to impact golden eagles.

3.5 VISUAL RESOURCES

This section describes an overview of the visual resources in and surrounding the Project Area and the potential impacts on these visual resources that would be associated with the No Action and Proposed Action Alternatives.

3.5.1 Affected Environment

Visual resources compose the visible character of a place and include both natural and human-made attributes. Visual resources influence how an observer experiences a particular location and distinguishes it from other locations. Such resources are important to people living in or traveling through an area and can be an essential component of historically and culturally significant settings. For this analysis, the scenery management system and associated analytical assessment procedures developed by the U.S. Forest Service are adapted for use within a natural and human-built environment and integrated with planning methods used by TVA. The general Project Area viewshed is evaluated based on its scenic attractiveness and scenic integrity. Scenic attractiveness is a measure of the scenic beauty of a landscape and is based on perceptions of the visual appeal of landforms, waterways, vegetation, and the human-built environment. Scenic attractiveness is assessed as either distinctive, typical/common, or indistinctive. As adapted for this analysis, scenic integrity measures the degree of visual unity of the natural and cultural character of the landscape. Scenic integrity is evaluated as either low, moderate, or high. This analysis also considers the existing character of the Project Site as an important factor in understanding the affected environment.

Approximately half of the Project Site itself is comprised of agricultural fields. Agricultural land in the southern parcel is primarily used for cow pasture. The remaining agricultural land appears to have been used to produce a rotational mix of corn, soybeans, and cotton. There are several stands of deciduous forest within the Project Site. These forested areas are located primarily along field margins, along drainage ways, and slopes too steep to farm. There are also small sections of scrub/shrub and open water throughout the Project Site. Photo 3.5-1 and Photo 3.5-2 present general views of the Project Site. Generally, the Project Area is rural and agricultural with isolated single-family homes, small residential concentrations, and some industrial development adjacent to the Project Site and as distance from the Project Site increases. The topography of the Project Area is characterized by flat terrain to gently rolling hills interspersed with stream drainages. Scenic attractiveness of the Project Area is rated as typical or common of a rural-agricultural and sparsely residential area. Scenic integrity is assessed as moderate to high due to the relative unity of the surrounding natural and cultural character.

Photo 3.5-1. View of agricultural field on the Project Site, looking southwest (taken in February/March 2019)

Photo 3.5-2. View of pasture on the Project Site, looking west (taken in February/March 2019)

Prominent visual resources surrounding the Project Site include several businesses, particularly along or off of US 72 and CR 33; two small residential concentrations, one north of CR 33 along Ruby Johnson Drive and one south of CR 33 along Belle Drive, both adjacent to the southwestern portion of the Project Site; one church along CR 33; and the Bellefonte Nuclear Plant, an unfinished nuclear power plant to the east of the Project Site.

US 72 extends along portions of the western boundary of the Project Site, and CR 33 generally frames the northern boundary of the Project Site. CR 33 also extends northeast-southwest, bisecting the central portion of the Project Site. The long-range views from US 72 are generally obscured by mature trees, except for a small portion of the SR 279 on-ramp to US 72 East.

Existing power lines are present in the Project Area along portions of US 72, CR 33, CR 558, and other major and minor roads in the vicinity. TVA's Bellefonte NP-Scottsboro 161-kV TL traverses the western portion of the Project Site in a northeast-southwest orientation.

The Earnest Pruett Center of Technology, formerly called Jackson County Technical School, is located approximately 0.5 mile north of the Project Site along US 72, and Hollywood Elementary

School is located approximately one mile northwest of the Project Site on CR 33. The long-range views of the Project Site from these facilities are obscured by surrounding wooded areas.

Of the two small residential concentrations near the Project Site, the closest is adjacent to the southwestern portion of the Project Site, north of CR 33 along Ruby Johnson Drive. Most of these residences were built in the late 1970s/early 1980s (USGS 2019c). The residences primarily consist of one-story brick ranch-style houses on lots surrounded by mature hardwoods and pines and/or among agricultural fields framed by mature trees.

The other small residential concentration near the Project Site is located south of CR 33 along Belle Drive, adjacent to the southwestern portion of the Project Site. This concentration consists of one-story brick ranch-style houses and manufactured homes that were built in the late 1970s/early 1980s (USGS 2019c). The residences are generally on lots framed with mature pines and hardwoods, and fields similarly framed by trees are visible in the distance (Photo 3.5-3).

Photo 3.5-3. View from the small residential concentration along CR 33 at the intersection of Belle Drive, looking northeast toward the Project Site (Google Street View)

Cedar Glade Baptist Church is adjacent to the central portion of the Project Site, along CR 33. Long-range views in all directions from the church are partially obscured by mature trees on the church property as well as those framing fields and/or roads nearby (Photo 3.5-4).

Photo 3.5-4. Cedar Glade Baptist Church along CR 33, adjacent to the central portion of the Project Site, looking southeast from CR 33 (Google Street View)

The unfinished Bellefonte Nuclear Plant is located approximately 0.5 miles to the east of the Project Site, along Bellefonte Road (Photo 3.5-5). TVA began construction on the Bellefonte Nuclear Plant in 1974 and halted the project in 1988. This 1,400-acre site contains two partially-constructed reactors, cooling towers, switchyards, office buildings, warehouses, a training center, parking lots, railroad spurs, and a helicopter landing pad (Power Magazine 2019). The nuclear plant is generally surrounded by forested land. The two cooling towers are the most prominent part of the plant and are visible from many locations in the surrounding area.

Photo 3.5-5. View of Bellefonte Nuclear Plant, looking east from Bellefonte Road (Google Street View)

3.5.2 Environmental Consequences

This section describes the potential impacts to visual resources should the Proposed Action or No 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 would not be constructed; therefore, no Project-related impacts to visual resources would result. Existing views of the Project Site would be expected to remain relatively unchanged from the predominant mix of agricultural, rural-residential, and forested land. Impacts to visual resources are likely as the nearby communities of Hollywood and Scottsboro grow.

3.5.2.2 Proposed Action Alternative

Visual concerns are often associated with both large and small-scale solar facilities and their electrical infrastructure. The Project Site consists of relatively flat to gently sloping terrain, and the Project would convert what is largely now agricultural, rural-residential, and forested lands to an industrial use mostly consisting of low-profile PV arrays. Figure 2-2, Figure 2-3, and Figure 2-4 show the location of the proposed Project elements, including the proposed Project Substation, Hollywood Switching Station, and new gen-tie line.

During the February and March 2019 site visits, the HDR field team assessed the potential for visual impacts from the Proposed Action. The proposed solar panels would be set back at least 50 feet to several hundred feet from US 72 and CR 33. Long-range views from the several businesses near the Project Site, particularly along or off of US 72 and CR 33, are generally limited by mature trees. Additionally, mature trees, combined with the setback of the Project, would generally shield views of distant Project elements from travelers on US 72 and CR 33. However, some Project elements would be visible from portions of these properties and roadways. The proposed Project Substation and Hollywood Switching Station would be constructed near the intersection of CR 33 and CR 113, in an area surrounded by mature trees, and is unlikely to be visible from US 72, CR 33, and CR 113. Additionally, lighting associated with the proposed Project Substation and Hollywood Switching Station would be downward-facing and timer- and/or motion-activated to minimize impacts to surrounding areas. Thus, the visual impacts to travelers along CR 33 and CR 113 are expected to be moderate to minor, depending on the existing tree buffers and slope of the terrain near these properties.

From Project Area vantage points along and off of CR 33, CR 186, and CR 558, the manufactured and structured appearance of the Bellefonte Solar Energy Center would be most apparent and likely more visually intrusive in the morning, when the metallic gray and black-colored solar panels would be upright, approximately eight feet from the ground at full tilt facing east. However, this effect would be least apparent at mid-day, when the panel profile would be lower (approximately five-feet-tall when lying flat). Photo 3.5-6 and Photo 3.5-7 present representative views of the type of solar panels proposed for the Project. In the evening, when the panels would be upright facing west, the visual effects would largely occur from Project Area vantage points along and off of US 72, CR 33, and CR 186. However, the substantial mature tree buffers throughout the Project Area and, in particular, along roadways, property lines, and around the perimeter of the Project Site would make these effects from the Project minimal.

Travelers along portions of US 72, CR 33, CR 186, and CR 558 may notice visual changes that would vary by location, as there are generally narrow buffers of trees between these roadways and areas of proposed solar panels. The trees to the immediate north and south of Cedar Glade Baptist Church would be cleared to prevent shading of the solar panels, making the Project elements, located approximately 140 feet south of the church, visible from the church property.

Overall, while portions of the Project would be visible across open fields or otherwise clear areas, residential and commercial properties and roadways in the Project Area generally have mature trees along or near property boundaries that would partially or fully obscure views of the solar facility from many vantage points. The relatively stable elevations and the maintenance of existing vegetation along the perimeter of the Project Site would largely shield views from most Project Area vantage points to the solar facility.

Construction of the proposed Project would temporarily alter the visual character of the Project Area. During construction, heavy machinery would be present, changing the visual aspects from Project Area vantage points. Within the 997-acre area to be developed for the Project, trees and other tall vegetation would be removed, and the area would be graded, changing the contour, color, and texture of the scenery attributes. The Project Site would appear as a mixture of neutral

colors such as browns and grays due to earthmoving, road construction, and concrete activities. Water would be used to keep soil from aerosolizing; thus, dust clouds are not anticipated. Visual impacts from construction would be minimal at night since most construction is anticipated to occur during the day. Erosion control silt fence and sediment traps would be removed once construction is complete, and bare areas would be promptly vegetated.

Indirect impacts to visual resources in the Project Area may occur due to increased traffic and movement of heavy machinery on the Project Site and along local roads. Overall, there would be minor direct and indirect impacts to visual resources during the construction phase of the Proposed Action. However, these impacts would be temporary (approximately 20 months).

Overall, the visual alteration from agricultural and undeveloped forested land to a large solar facility in an area where scenic integrity is rated as moderate to high due to the relative unity of the surrounding natural and cultural character is expected to result in minor adverse impacts. Visual impacts during the operation phase of the Project would be minor in the immediate vicinity, due to substantial tree buffers around property boundaries in the Project Area. Visual impacts would be minimal to negligible on a larger scale, due to variation of the visual attributes of the Project Area as distance from the Project increases.

Photo 3.5-6. Single-axis, tracking photovoltaic system with panels showing some tilt as viewed from the east or west

Photo 3.5-7. The backside of the single-axis tracking photovoltaic solar panels

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 No Action and Proposed Action Alternatives.

3.6.1 Affected Environment

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

such as construction. The A-weighted sound level represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974). For reference, approximate noise levels (measured in dBA) of common activities/situations are provided in Table 3-6.

Table 3-6. Noise Levels of Common Activities/Situations

Activity/Event	dBA
Lowest audible sound to person with average hearing	0
Quiet rural, nighttime	25
Quiet urban, nighttime	45
Large business office	60
Normal speech at three feet	70
Noisy urban area, daytime	75
Food blender at three feet	90
Gas lawn mower at three feet	100
Jet flyover at 1,000 feet	110

Source: Caltrans 2013

Noises occurring at night generally produce a greater annoyance than do noises of the same levels occurring during the day. People generally perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are about 10 dBA lower than those during the day (USEPA 1974).

The Project Site is within an agricultural, rural-residential, industrial, and undeveloped area of southern Jackson County. Ambient noise in the Project Area consists mainly of agricultural sounds, such as noises from farm machinery; natural sounds, such as from wind and wildlife; and moderate traffic sounds. Noise levels of these types generally range from 45 to 55 dBA (USDOT 2015). The light industrial areas along US 72, located north and west of the Project Site, likely have normal sound levels above the typical 45 to 55 dBA in the Project Area. TVA's Bellefonte Nuclear Plant, to the east of the Project Site, is not operational; therefore, sound levels are not more than typical in that location, nor is the plant considered a noise receptor.

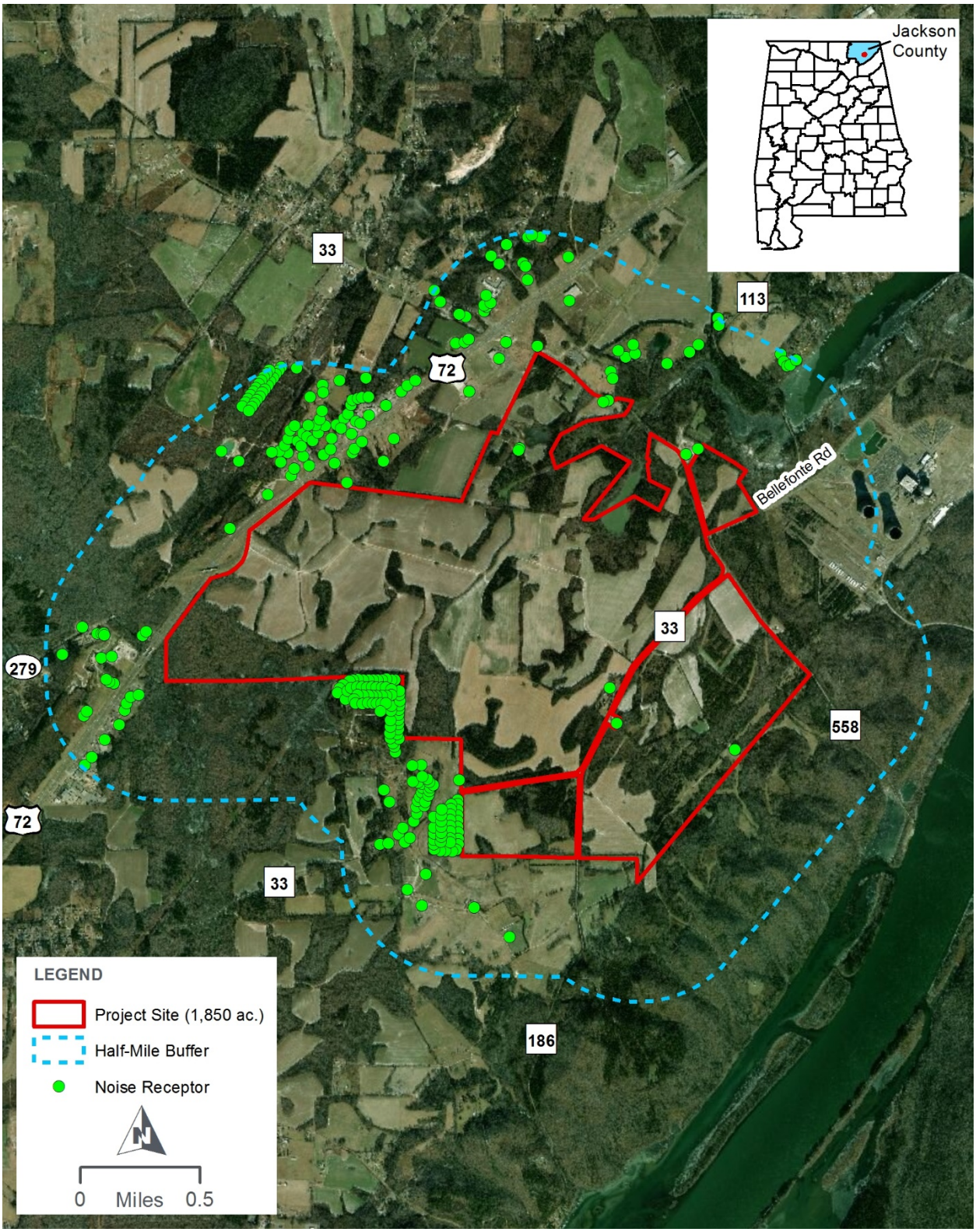

Figure 3-14. Noise-sensitive receptors in the Project Area

The Project Site and a surrounding 0.5-mile radius were examined to identify potential noise-sensitive receptors. Noise-sensitive receptors are defined as those locations or areas where dwelling units or other fixed, developed sites of frequent human use occur. Approximately 290 noise-sensitive receptors are within the area examined (Figure 3-14). These primarily consist of single-family residences, residential farm complexes, associated outbuildings, nonresidential agricultural complexes, light industrial commercial and retail operations, and religious properties, with each building on a property generally counted as one receptor. Residential concentrations are located near the southwestern portion of the Project Site, while concentrations of commercial operations and some residences surround the northern portion of the Project Site. Two single-family residences, one agricultural outbuilding, and one nonresidential agricultural complex appear to be extant on the Project Site. These and other noise-sensitive receptors, which occur around the perimeter of the Project Site, range from approximately 45 feet to approximately 1,533 feet from proposed PV array locations.

3.6.2 Environmental Consequences

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

3.6.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed and no Project-related impacts on the ambient sound environment would occur. Existing land use would be expected to remain a mix of agricultural, rural residential, and undeveloped, forested land; therefore, the ambient sound environment would be expected to remain as it is at present.

3.6.2.2 Proposed Action Alternative

Direct and indirect noise impacts associated with implementation of the Proposed Action would primarily occur during construction. Construction equipment produces a range of sounds while operational. Noisy construction equipment, such as delivery trucks, dump trucks, water trucks, service trucks, bulldozers, chain saws, bush hogs, or other large mowers for tree clearing, produce maximum noise levels at 50 feet of approximately 84 to 85 dBA. This type of equipment may be used for approximately 20 months (approximately 600 days) at the Project Site.

Construction noise would cause temporary and minor adverse impacts to the ambient sound environment around the Project Area. Several residences, residential and nonresidential agricultural complexes, and light industrial commercial and retail operations are located within a 0.5-mile distance from the Project Site and would temporarily experience heightened noise during construction, primarily from pile-driving activities. However, when the commercial operations and agricultural complexes are active, these facilities likely produce ambient sounds that are at or higher than the typical 45 to 55 dBA in the Project Area, and these existing noises would help make effects from the Project more minimal. Additionally, construction would primarily occur during daylight hours, between sunrise and sunset; therefore, the Project would not affect ambient noise levels at night during most of the construction period. Most of the proposed equipment would not be operating on site for the entire construction period but would be phased in and out according to the progress of the Project.

The activity likely to make the most noise for an extended time period would be pile driving during the construction of the array foundations, which would take approximately six months to complete. Standard construction pile drivers are estimated to produce between 90 to 95 dBA at a distance of 50 feet (USDOT 2011). The piles supporting the solar panels are anticipated to be driven into onsite soils and potentially into limestone, depending on the depths of piles and of the underlying residuum of limestone in areas where piles would be installed; however, overburden soil thickness will not be confirmed until geotechnical studies occur prior to construction. Construction workers would wear appropriate hearing protection in accordance with Occupational Safety and Health Act (OSHA) regulations. Noise-sensitive receptors adjacent to the Bellefonte Solar 161-kV Project Substation, Hollywood 161-kV Switching Station, associated gen-tie connection, and proposed work areas along the existing Bellefonte NP-Scottsboro 161-kV TL would temporarily experience heightened noise primarily during pole drilling for the new TL pole structures during daylight hours.

Existing ambient noise in the Project Area generally ranges from 45 to 55 dBA and consists mainly of agricultural sounds, such as noises from farm machinery; natural sounds, such as from wind and wildlife; and moderate traffic sounds. Since construction would only occur during the day for most of the construction period, at the same time that commercial and agricultural activities and increased traffic would occur, there would not be a significant difference in noise levels with implementation of the Project other than during the six-month period when pile driving activities would occur. Effects from the Project during this period would be moderate for noise sensitive receptors within 45 to 60 feet of these activities and minor for those farther off. However, the location of these activities on the Project Site are not expected to be in proximity to any one noise receptor for the entire six-month period.

Following completion of construction activities, the ambient sound environment on and surrounding the Project Site would be expected to return to existing levels or below, by eliminating some seasonal use of agricultural equipment. The moving parts of the PV arrays would be electric-powered and produce little noise. The central inverters would produce noise levels of approximately 65 dBA at 33 feet, and the Project Substation would emit approximately 50 dBA at 300 feet. As no noise receptors are within 33 feet of proposed inverter locations or within 300 feet of the Project Substation, these effects from the Project are anticipated to be minimal to negligible. The periodic mowing of the Project Site to manage the height of vegetation surrounding the solar panels would produce sound levels comparable to those of commercial and agricultural operations in the Project Area; however, Project-related mowing would occur at less frequent quarterly intervals than typical agricultural operations. Consequently, the Proposed Action would have minimal effects on noise levels as a result of normal continuous operation.

Overall, implementation of the Proposed Action would result in minor, temporary adverse impacts to the ambient noise environment in the Project Area during construction, and minimal to negligible impacts during operation and maintenance of the solar facility.

3.7 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

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

3.7.1 Affected Environment

Ambient air quality is determined by the type and concentration of pollutants emitted into the atmosphere, the size and topography of the air shed in question, and the prevailing meteorological conditions in that air shed. Through its passage of the Clean Air Act of 1970 and its amendments, Congress mandated the protection and enhancement of our nation's air quality. USEPA 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, nitrogen dioxide, particulate matter whose particles are less than or equal to 10 micrometers (PM_{10}), particulate matter whose particles are less than or equal to 2.5 micrometers ($PM_{2.5}$), carbon monoxide (CO), and lead.

The primary NAAQS were promulgated to protect 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 not in compliance with the NAAQS are designated as "nonattainment" areas. New sources being located in or near nonattainment areas may be subject to more stringent air permitting requirements. Nonattainment areas are usually defined by county. National standards, other than annual standards, may not 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. Finally, areas that were formerly designated as nonattainment for a pollutant and later come into attainment are then categorized as "maintenance" for that pollutant for the next 20 years, assuming they continue to meet the NAAQS for that pollutant. If an area remains in attainment for the 20-year maintenance period, the status reverts back to normal attainment.

3.7.1.1 Regional Air Quality

The Project Area in rural Jackson County has little development in the vicinity apart from that related to rural-residential and agricultural uses. Denser development is approximately 30 miles or more to the west in Madison County, where the Huntsville suburban area has been expanding in recent years. Jackson County is considered within maintenance attainment status for $PM_{2.5}$ and in attainment for all other pollutants (USEPA 2019a).

Table 3-7 presents the most recent USEPA emission inventory data (USEPA 2019b) for the most prevalent NAAQS pollutants for Jackson County. These data represent anthropogenic emissions from all stationary source and mobile source activities. The table also provides a comparison of Jackson County emissions with the more populated and industrialized Madison County adjacent to the west. The predominantly rural Jackson County has relatively low emissions in comparison to Madison County and is expected to have generally good air quality.

Table 3-7. Average 2014 emissions of NAAQS pollutants in Jackson County, as compared with Madison County

Pollutant	Emissions (tons per year)	
	Jackson County	Madison County
Carbon Monoxide	23,669	68,823
Nitrogen Oxides (NO_x)	5,940	10,602
PM_{10}	10,248	17,846
$PM_{2.5}$	3,511	5,225
Sulfur Dioxide (SO_2)	7,442*	1,393
Volatile Organic Compounds (VOCs)	29,185*	24,201

**TVA's Widows Creek Fossil Plant was a major source of the SO_2 and VOC emissions in 2014. Widows Creek Fossil Plant was shut down in 2015, so current SO_2 and VOC emissions are likely notably less than those in 2014.*
Source: USEPA 2019b

3.7.1.2 Regional Climate

Weather conditions determine the potential for the atmosphere to disperse emissions of air pollutants. Based on climate data from Scottsboro, Alabama, approximately three miles west of the Project Area, the coldest month is January, with average maximum and minimum temperatures of approximately 51 degrees Fahrenheit (°F) and 29°F, respectively. The warmest month is July, with average maximum and minimum temperatures of approximately 90°F and 67°F, respectively. Precipitation is highest from November through May and averages 57 inches per year (NOAA 2019). Average annual snowfall is one inch per year.

Figure 3-15 is a chart of annual average temperatures over the 125-year period (1893-2018) of record for Scottsboro, Alabama, based on data from Iowa Environmental Mesonet (IEM 2019). The trend line on the chart, as indicated by the embedded line slope equation, shows little change in average temperature over the period of record, although there appears to be some cyclical variation.

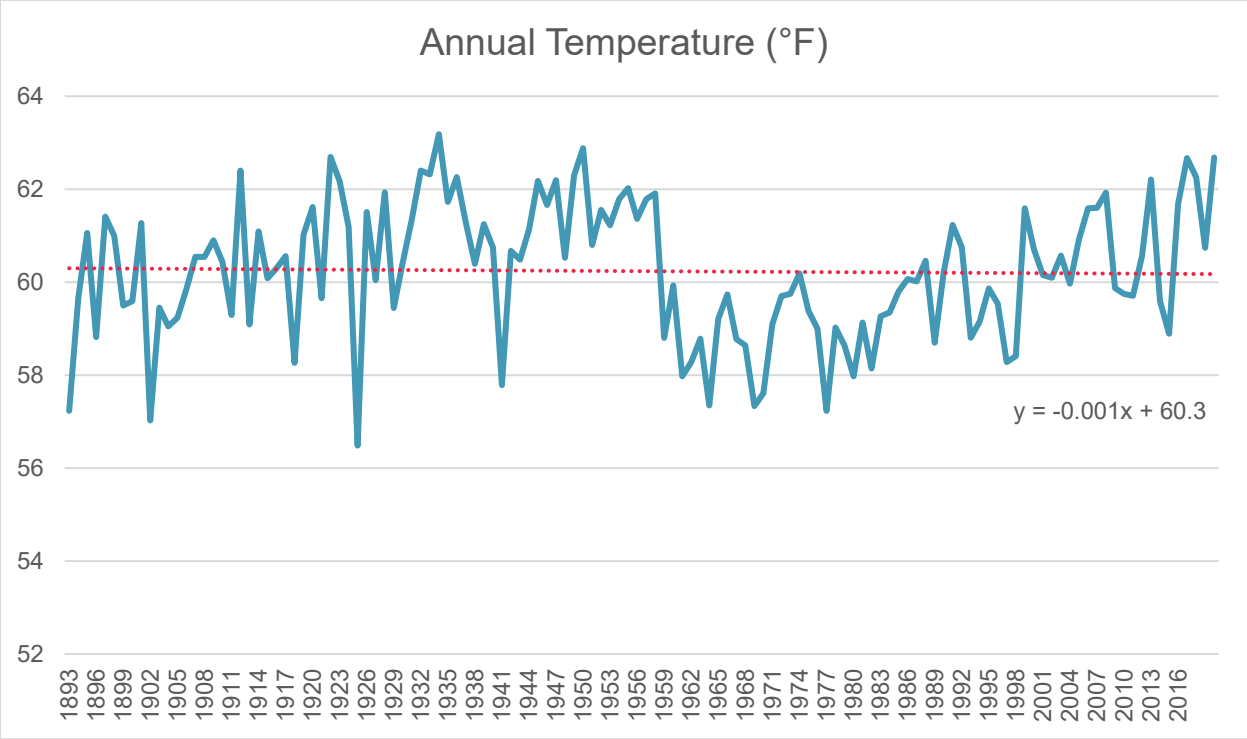

Figure 3-15. Annual Average Temperature for Scottsboro, AL over 125-Year Record

3.7.1.3 Greenhouse Gas Emissions

GHGs include natural and man-made compounds that disperse throughout the earth's atmosphere. These compounds absorb a portion of Earth's infrared radiation and reemit some of it back to the ground, thus keeping surface temperatures warmer than they would be otherwise. In this way, GHGs act as insulation and contribute to the maintenance of global temperatures. As the levels of GHGs in the atmosphere increase, the result is an increase in temperature on earth, commonly known as global warming. Climate change associated with global warming produces negative economic and social consequences across the globe through changes in weather (e.g., more intense hurricanes, greater risk of forest fires, flooding) (USGCRP 2018). However, as shown in Figure 3-15, for the Project Area in northeastern Alabama, there is currently no noticeable long-term upward trend in temperature.

Apart from water vapor, the primary GHG emitted by human activities in the US is CO_2, representing approximately 82 percent of total GHG emissions in the US (USEPA 2019c). The largest source of CO_2 and of overall GHG emissions is fossil fuel combustion. US emissions of the GHG methane, which have declined from 1990 levels, result primarily from enteric fermentation (digestion) associated with domestic livestock, decomposition of wastes in landfills, coal mining, and leakage of natural gas from petroleum drilling and production activities. Agricultural soil management is the major source of the GHG nitrous oxide emissions in the US, representing approximately 74 percent of its emissions from human activities (USEPA 2019c). GHG emissions from the TVA power system are described in TVA's 2019 IRP Final EIS (2019a).

3.7.2 Environmental Consequences

This section describes the potential impacts to climate and air quality should the Proposed Action or No Action Alternatives be implemented.

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no Project-related impacts on climate or air quality would result. Existing land use is expected to remain a mix of agricultural fields and forested land, and the existing habitat would be expected to remain as it is at present, with little effect on climate and air quality. The main source of emissions in the Project Area would continue to be from mobile sources such as automobiles and agricultural equipment.

3.7.2.2 Proposed Action Alternative

Under the Proposed Action, minor direct impacts to air quality would be anticipated as a result of construction and operation of the Project. Temporary impacts to GHG emissions expected during construction would be negligible.

Regional Air Quality

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 employees' personal vehicles, and fugitive dust suspension from clearing, grading, and other activities. Tree debris from clearing would be removed by either burning or chipping and grinding. As burning may occur, this could generate temporary localized air quality impacts due to smoke particles and gases. Any such burning of vegetative debris would be done in accordance with any local ordinances or burn permits, and is not expected to have any health consequences for this sparsely populated rural area.

The use of construction equipment would cause a minor temporary increase in GHG emissions 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 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 air quality impacts overall.

Approximately 95 percent (by weight) of fugitive emissions from vehicular traffic over paved and unpaved roads would be composed mainly of particles that would be deposited near the roadways, along the routes taken to reach the Project Site. As necessary, fugitive dust emissions from construction areas and paved and unpaved roads would be mitigated using BMPs including wet suppression. Wet suppression can reduce fugitive dust emissions from roadways and unpaved areas by as much as 95 percent. Therefore, direct impacts to air quality associated with construction activities would be expected to be minor.

Regional Climate

No noticeable direct or indirect impacts to the regional climate would be associated with the construction of the proposed Project. Local or regional climate effects can occur, for example, with major changes in land use that affect the hydrological cycle, or that create large impervious surfaces, thus changing the radiative heat balance over a large area. The Project would change the surface characteristics somewhat, but it would have little effect on soil permeability and hydrologic characteristics of the developed area. Vegetation would still grow under and around the solar panels, tending to maintain a landscape with significant evapotranspiration of precipitation, as opposed to creating significant runoff of precipitation that happens with urban development, which can create a "heat island" effect. Therefore, average temperatures of the developed area are not expected to change significantly due to the proposed development.

Greenhouse Gas Emissions

The use of construction equipment would cause a minor temporary increase in GHG emissions during construction activities. Combustion of gasoline and diesel fuels by internal combustion engines (trucks and off-road vehicles) at the site would generate emissions of CO_2 and very small amounts of other GHGs such as methane and nitrous oxide. Additional GHG emissions would occur due to transporting materials and workers to the Project Site, and GHGs would be emitted in the US or globally for production and transportation of the materials used for construction. The production of construction materials is expected to represent the largest portion of the Project-related GHG emissions. The total GHG emissions due to construction should eventually be offset by Project operation over the long term, assuming that the electricity generated by the Project will offset some fossil-fuel-based electricity generation and associated GHG emissions.

Tree and other tall vegetation removal during construction of the Project would represent a minor loss of sequestered carbon, as well as potential future carbon sequestration. Trees and other tall vegetation currently remove CO_2 from the air and sequester it as biomass. The loss of this carbon sink would constitute a minor adverse direct and indirect impact as sequestration would have continued for the life of the vegetation and long into the future, assuming that other changes on the Project Site did not result in deforestation. The loss of the carbon sink from tree removal would be at least partially offset by the increased sequestration of CO_2 by the permanent grass-dominated vegetation that would be maintained on the Project Site.

The operation of the Project is not anticipated to have any negative impacts to air quality or GHG emissions. No emissions would be produced by the operation of the solar facility or electrical lines. Minor emissions would occur during maintenance activities, including facility inspections and periodic mowing. Conversely, overall emissions of air pollutants from the TVA power system would decrease during operation as the nearly emissions-free power generated by the solar facility would offset power that would otherwise be generated, at least in part, by the combustion of fossil fuels. The reduction in GHG emissions resulting from the operation of the solar facility would have little noticeable effect at regional or larger scales. It would, however, be a component of the larger planned system-wide reduction in GHG emissions by the TVA power system. The adverse impacts of GHG emissions and the beneficial impacts of TVA's reduction in GHG emissions are described in more detail in the TVA IRP (2019).

3.8 CULTURAL RESOURCES

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

3.8.1 Affected Environment

Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities and/or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts.

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (54 U.S.C. § 300101 *et seq.*), is specifically designed to address the effects of federal and/or federally funded projects on tangible cultural resources—that is, physically concrete properties—of historic value. The NHPA provided for a national program to support both public and private efforts to identify, evaluate, and protect the nation's important cultural resources. Once identified, these resources are evaluated for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service. Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases) and if found to embody one or more of four different types of values, or criteria, in accordance with 36 CFR § 60.4:

- *Criterion A:* association with events that have made a significant contribution to the broad patterns of our history. Such events may include a specific occurrence or pattern of occurrences, cultural traditions, or historic trends important at a local, regional, or national level. To be considered in association with a cultural resource, events must be important within the particular context being assessed.

- *Criterion B:* association with the lives of persons significant in our past. People considered may be important locally, regionally, or nationally, and the cultural resources considered are limited to properties illustrating a person's achievements rather than commemorating them.

- *Criterion C*: embodiment of the distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possessing high artistic values; or representative of a significant and distinguishable entity whose components may lack individual distinction. Cultural resources considered generally include architectural resources such as buildings, objects, districts, and designed landscapes.

- *Criterion D*: cultural resources that have yielded, or may be likely to yield, information important in prehistory or history. Considered cultural resources typically include archaeological sites but may also include buildings, structures, and objects if they are the principal source of important information not contained elsewhere.

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

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

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

A project may have effects on a historic property that are not adverse. However, if the agency determines that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the NRHP (based on the criteria for evaluation at 36 CFR part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site or erecting tall buildings or structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesigning a project to lessen the effects or installing visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic buildings and structures sometimes involves thorough documentation of the resource by compiling historic records, studies, and photographs.

Agencies are required to consult with the appropriate SHPOs, federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA reviews to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered by federal agencies. Generally these considerations, as well as those of NRHP-eligible traditional cultural resources (also called traditional cultural properties; see Parker and King 1998), are

accomplished through consultation with parties having a vested interest in the undertaking, as described above.

The following section summarizes the prehistoric and historic contexts from the Phase I cultural resources survey report. For the complete cultural contexts, please refer to the full technical report in Appendix D. The newly identified resources are described more fully in Section 2.

3.8.1.1 Cultural Context

The cultural context provides a basis for developing expectations of archaeological site potential and evaluating the NRHP eligibility of sites in the Project Area. This discussion presents previous research in the area along with the prehistoric and historic contexts for the region. The prehistoric overview describes significant developments in subsistence, settlement, and technology. The historic overview focuses on Jackson County and the communities in the Project Area.

Paleoindian Period (15,000-10,000 Before Present (B.P.))

Human occupation of eastern North America is thought to have first occurred between 15,000 and 12,000 B.P. (Anderson et al. 1996) at the end of the last glacial era. The Paleoindian period in the Southeast is part of a geographically diverse, but relatively homogenous, culture typified by lithic artifacts, particularly the fluted and unfluted lanceolate projectile points (Agenbroad 1988:63; Tankersley 1994:96). The period is commonly divided into the Early Paleoindian “Clovis” (circa 15,000-10,800 B.P.), the Middle Paleoindian “Cumberland” (circa 10,800-10,500 B.P.), and the Late Paleoindian “Dalton” (circa 10,500-10,000 B.P.). The only differences between these cultural contexts are small variations in material culture, specifically the morphological differences in projectile point types.

Archaic Period (10,000-3,000 B.P.)

The Archaic period (circa 10,000-3,000 B.P.) is commonly divided into Early (10,000-8,000 B.P.), Middle (8,000-5,000 B.P.), and Late (5,000-3,000 B.P.) subperiods based on specific projectile point types. The Archaic coincided with a time of climate change as the onset of warmer and wetter conditions of the early Holocene emerged. In addition to changes in temperature and precipitation, there was a significant rise in sea levels caused by the melting of the continental glaciers. Important cultural developments of the period included population growth, expansion into new environmental zones, and the appearance of regional projectile point styles. The Early Archaic coincided with the end of the Pleistocene climatic conditions and the extinctions of megafauna species in the region. Diagnostic hafted biface types for the period include Kirk Corner Notched, Palmer, Plevna, Lost Lake, Pine Tree, and some Big Sandy forms (Big Sandy Broad Base) (Cambron and Hulse 1975). Early Archaic adaptations represent a shift to seasonally available plant and animal resources. The Middle Archaic is comprised of distinct cultural traditions that evolved from the Paleoindian and Early Archaic periods. As the climate warmed, cultural regionalization increased (Smith and Chapman 1993). Flora and fauna came to resemble those of modern times. Human subsistence practices focused on cyclical use of seasonally available hunted and gathered resources (Jefferies 1996). The Late Archaic in northern Alabama is divided into two distinct cultural phases: Lauderdale and Little Bear Creek. The Lauderdale

phase represents the classic “Shell Mound Archaic,” although McNutt et al. (1998) pointed out that this phase is in need of refinement in the region.

Gulf Formational Period (4,500-2,200 B.P.)

The Gulf Formational period overlaps the traditional Late Archaic period in northern Alabama and is divided into Early (4,500-3,000 B.P.), Middle (3,000-2,500 B.P.), and Late (2,500-2,200 B.P.) periods. First documented by Walthall and Jenkins (1976), the Gulf Formational period is distinguished by the presence of ceramics with discrete traits. These ceramics are fiber-tempered and molded from single masses of clay. Ceramics manufactured during the later Gulf Formational exhibit sand tempering and coiling. Decorative techniques include incising, punctating, pinching, and rocker and dentate stamping on globular and flat-bottomed bodies, occasionally with podal supports (Walthall and Jenkins 1976). Flat-based vessels with bosses (punctations from the vessel interior) are also common. The end of the Gulf Formational is marked by the dominance of southern Appalachian and northern tradition ceramic wares (Caldwell 1958; Walthall 1980). The Gulf Formational remains similar to the Archaic in terms of material culture and economics, but there are differences compared to Woodland settlement patterning and distribution, economics, and ceremonialism (Walthall 1980).

Woodland Period (2,200-1,100 B.P.)

The Woodland period is dated from approximately 2,200-1,100 B.P. and differs from the preceding Archaic and Gulf Formational periods in many important ways. This period sees an increase in sedentism and reliance on horticulture. With the introduction of the bow and arrow, projectile points decreased in size and become more uniform in style (McNutt et al. 1998). Ceramics were no longer tempered with fibrous material, but with crushed limestone and grog (i.e., pulverized baked ceramic sherds). The addition of tempering materials to soft clay made it more workable and reduced cracking during the drying process. The exteriors of early pots were either plain or bore the impression of handwoven fabric or netting. A variety of vessel forms were made, from large open-mouthed jars to small serving bowls. Decoration was applied to the rims, if used at all. Throughout the Middle Woodland, exterior vessel surfaces were increasingly marked with tightly spaced parallel cord impressions or carved paddle motifs rather than fabric markings. Cordmarking becomes the most common motif during the Middle Woodland, although by the late Middle Woodland, plainware dominates. Late Woodland ceramic assemblages are dominated by Flint River Brushed in the east and Baytown Plain in the west (Walthall 1980; Sears and Griffin 1950; McNutt et al. 1998). Cord-marked pottery was common at most sites by this time, but is consistently a minority.

Mississippian Period (1,100-450 B.P.)

Mississippian culture in the Middle Tennessee Valley can be generally characterized by shell tempered ceramics in a variety of vessel shapes, and small triangular projectile points (Alexander 1979). The settlement-subsistence patterns of this period is based on floodplain horticulture of maize, beans, and squash. Protein sources included deer, turkey, small mammals, and aquatic species, hunted by bow and arrow. Towns and villages were organized around ceremonial centers containing mounds and central plazas that served several outlying small, local farmsteads

and hamlets (McNutt et al. 1998). Single set post or wall trench wattle-and-daub houses became the primary building style during this period.

Maize, the primary food source during this period, combined with the overall increased commitment to agriculture, had significant impacts on the organizational complexity of the northern Alabama populations at this time (Service 1971). The relatively egalitarian communities of the Woodland period transitioned into hierarchical societies with hereditary leadership and managerial organizations (McNutt et al. 1998; Service 1971). These stratified sociopolitical organizations are commonly referred to as chiefdoms.

With the increased organizational complexity, there is the appearance of truncated, flat-topped pyramidal mounds. These served as religious structures and the locations for residences of high status individuals. Status distinctions were reinforced through differential access to non-utilitarian items such as conch shell adornments, beads, gorgets, native copper, and exotic chipped stone. Status was further reflected in burials (McNutt et al. 1998; Service 1971).

The Mississippian period also saw the introduction of ceramics tempered with crushed and burned shell, which allowed more flexibility and creativity in pottery manufacture (Holmes 1903). There are two essential shell-tempering techniques from the “Middle Mississippian Valley.” One of these uses quantities of coarsely crushed shell particles, and the other uses ground shell “powder.” These are referred to as Mississippi Plain and Bell Plain (Phillips 1970:vol. 60). Mississippi Plain was typically used for large utilitarian domestic cooking and storage vessels, while Bell Plain for serving bowls and more elaborately decorated vessels. Surface decorations include plain or polished exterior, incised, engraved, punctated, noded, or slipped in various designs.

Protohistoric Period/European Contact 9500-200 B.P.)

While there is evidence that Mississippian cultures were active in the Lower Ohio and Mississippi River valleys into the seventeenth century, evidence of Mississippian culture in the region appears to have declined sharply or disappeared altogether by 450 B.P. When the first Europeans arrived in these areas during the earl eighteenth century, they found the land nearly devoid of human occupation. A number of historically known tribes such as the Cherokee, Shawnee, Chickasaw, and Creek claimed the region as part of their broad hunting territory but were expelled or removed by white settlers by 1800.

Calhoun Treaty and Alabama Statehood: 1819

The Calhoun Treaty of 1819, one of several Cherokee secession treaties, is named for former Vice President John C. Calhoun who negotiated the terms while U.S. Secretary of War. This treaty ceded all lands from the Little Tennessee River south to the Hiawassee River, including Jackson County.

Later that year on December 14, Alabama gained statehood. Congress created the Alabama Territory on March 3, 1817, and appointed William Wyatt Bibb governor. White settlers immediately began moving to the new territory in hopes of establishing land claims and pushing for the expansion of slavery, which included encouraging Cherokee and other Indians to adopt the practice (Hagood 2017). With so much fertile land along the Middle Tennessee River,

"Alabama Fever" overtook the area that became Jackson County, which was already covered in settlers and squatters. In the face of this interest, the new state began claiming that the Cherokee reservations were not valid because the federal government was slow to survey the land (McLoughlin 1981:21–22). Over the next decade, the state of Alabama unsuccessfully petitioned Congress for the rights to buy any expired life estates from the Cherokee. A few of the fee-simple, mixed Cherokee were able to sell their reservations quickly and profitably. The town of Bellefonte is situated on one of the fee-simple Cherokee reservations.

Founding of Bellefonte and Antebellum Era: 1821-1860

According to the Jackson County Historical Association, James Riley conveyed his reservation to Dr. George Washington Higgins and Stephen Carter on October 3, 1820 under penal bond of $13,000 (Chambless 2002:7; Nance and Bastian 1974:2). In a preemptive move, the newly formed Alabama legislature had made Riley's reservation a voting site only five days after becoming a state. Thus, Higgins and Carter began planning to purchase the land from Riley right away. Riley died sometime in 1824, after the payments were complete but before signing a deed to convey the property. His wife, Jane Riley, then became administratrix of the estate and conveyed the deed for the reservation on July 20, 1827. Members of the Jackson County Historical Association researching the founding of Bellefonte deduced that "it is evident from the early deeds books, which began in 1830, that Higgins and Carter had sold lots in Bellefonte long before this time. They probably began selling shortly after buying the reservation" (Chambless 2002:7).

Despite the delay on legal conveyance of the deed, Bellefonte was incorporated on December 15, 1821. The first town incorporated in Jackson County, the state legislature proclaimed "that the town of Bellefonte in the County of Jackson be, and the same is hereby established and incorporated, including 60 acres, agreeably to the plan of said town" (Gist 1968:30). This land had many attractions for settlers. Not only was it near the river and considered to be fertile and viable, but the delay in opening public lands in Alabama had led to an abundance of settlers who were technically deemed squatters. Because Congress denied preemptive rights to squatters, they were subject to removal and forfeit of any crops and improvements (Nance and Bastian 1974:3). The land to which Higgins and Carter had a claim drew more people, investment, and effort than most other land in Jackson County because the probability of clear title was much better. While other settlers waited on Congress to grant preemptive rights, Bellefonte was already bustling (Nance and Bastian 1974:6).

The town was planned with streets running northwest to southeast and northeast to southwest with a public square in the middle (Chambless 2005:4). A document in Deed Book D of Jackson County (1830-1835) names six streets: Adams, Cross, Jackson, Russell, Main, and Spring (Chambless 2002:13). Spring Street, and probably Bellefonte itself, was named for the spring nearby. No record has been found regarding the name of Bellefonte, however, according to the county historical association, "in 1819, Charles Lewis, a Virginian and an attorney living in Franklin County, Tennessee, began selling his property in preparation for his move to Alabama. He apparently relocated to Bellefonte soon afterwards. The name of his great-grandfather's home in Virginia was Bellefonte" (Chambless 2002:7).

As of the 1850 census, approximately 300 people lived in the town of Bellefonte (U.S. Census Bureau 2013). By the mid-nineteenth century, along with the merchants, millers, and newspapers, the town had at least four doctors, six merchants, three grocers, six blacksmiths, two tailors, four carpenters, five shoemakers, a printer, a saddler, and a stone mason in 1850 (Chambless 2005:8). Cotton dominated the Southern economy at this time and, while not all of Northeast Alabama was conducive to row crops, the low floodplains of the Tennessee River that divided Jackson County were particularly suitable for it. The river was also the primary means of transporting crops and other goods such as, sugar, coffee, whisky, and manufactured products (Nance and Bastian 1974:7).

A great change occurred in the 1850s—the railroad came to Northeast Alabama. Bellefonte's location on the Tennessee River had contributed to significant growth and economic developed. When the Memphis & Charleston Railroad (M&C RR) proposed building a line through the town, landowners, most likely those with interest in river trade, declined. Instead, it was routed to the north in present-day Hollywood. Meanwhile, Bellefonte resident Robert T. Scott purchased land to the west of town and persuaded the railroad to go through his property. The M&C line was completed in 1858 and subsequently many Bellefonte families followed Scott to what later became Scottsboro (Lee 2014; Chambless 2005:9). While plenty of people and businesses remained in Bellefonte, the town would not survive the Civil War.

The Civil War: 1861-1865

The Middle Tennessee River and North Alabama were a focus for the Union Army and the locale of several battles, sieges, and campaigns. Bellefonte, as the seat of Jackson County, was constantly occupied by Union troops from 1862-1864. When the Union's Army of the Cumberland left Bellefonte to join the force that went on to fight at Chickamauga, Atlanta, and partake in Sherman's March to the Sea, the town was devastated. By late 1862, Union troops had burned much of the countryside in Madison and Jackson counties. A notice in *The Charleston Mercury* dated September 20, 1862 announced news from north Alabama confirming that troops under Generals Buell and Rosencrans made their way to Stevenson, leaving everything "between Huntsville and Stevenson . . . desolated and deserted, Jackson County having been left almost entirely without inhabitants or signs of animal life." The train depots at Camden (Paint Rock) and Larkinsville, the town of Woodville, and the bridge over Paint Rock River were destroyed. The informant told the newspaper that from Woodville "to Bellefonte scarcely a house is left standing" (Chambless 2005).

The Civil War and its destruction led to the end of Bellefonte's position as county seat. The war left the courthouse ruined and the county's early records destroyed. Sargent Major Widney's letter describes the courthouse as "an excellent … built of brick and 2 stories high…surrounded by a fine cluster of locust trees." He explains that the headquarters were moved into the courthouse and the soldiers "found all the old records of the county scattered over the floor. The documents were dated as far back as 1820. About 50 large books we [Union soldiers] reserved while the remaining books and papers were collected in one great heap and burned" (Chambless 2005:9). While not every building was destroyed during the war, the majority of the inhabitants did not rebuild and thus contributed to Bellefonte's decline. Several of Bellefonte's antebellum buildings

were later moved, intact, to Scottsboro. Some were dismantled and their materials used elsewhere. For a while following the war, the post office continued to function, court was held, and people tried to go about their business (Nance and Bastian 1974:24).

Decline of Bellefonte and the Rise of Scottsboro: 1865-1920

Following the Civil War and destruction of the courthouse and many of its records, some were left with no proof of land ownership to pass on to their heirs (The National Society of the Colonial Dames of America in the State of Alabama 1966:35; Gist 1968:31). Some older deeds may have survived owing to a previous fire at the Bellefonte courthouse in 1844, which prompted the recreation of deeds in the Madison County court (Chambless 2005:8). Due to lost records, the exact extent of Bellefonte is unclear. However, existing deeds mention at least 150 lots (Nance and Bastian 1974:8). Bellefonte of the 1870s remained centered on the river landing and cotton farming. There was less commerce, but a small contingent carried on, particularly the Martins. Daniel Martin wrote regularly to his daughter in Texas, informing her in 1873 that his son lived in an old house in Bellefonte, raised cotton, and operated a gin (Nance and Bastian 1974:25). A decade later, 100 people lived in Bellefonte, including 11 farmers, five merchants, two doctors, a lawyer, a notary public, and a Justice of the Peace. The town suddenly declined around 1880, though: the Masonic lodge disbanded, the post office closed, the population dropped, and the few accounts of the town referred to it as “Old” Bellefonte (Nance and Bastian 1974:26).

The emerging town of Scottsboro drew businesses and residents away from Bellefonte. Founder Robert T. Scott (1800-1862) moved from Raleigh, North Carolina to Madison County, Alabama, about 1820. After the death of his father in 1829, Scott moved to Bellefonte where he purchased a plot north of present-day Bellefonte Road in 1839. Throughout the 1850s, he bought land to the west of Bellefonte where his brother, William, already owned some land. Between 1853 and 1859, Scott purchased six land patents for a total of 280 acres where he planned to establish a town (Chambless 2001:12; U.S. Bureau of Land Management n.d.).

While Scott’s settlement began with simple improvements, such as establishing a grist mill and shingle factory (Schmidt 2017), he developed a plan for a city based around a planned for railroad, and was successful in persuading the railroad company to build through his land. As early as the 1850s, he platted and sold lots and lobbied the county commissioners to move the seat from Bellefonte. On November 13, 1868, the county commissioners voted to relocate the county seat to Scottsboro. All surviving county records were moved there for storage in the new courthouse (completed by 1870). The town square of Bellefonte was auctioned by the commissioners and sold to Hamlin Caldwell for $275. A prominent citizen and landowner in Bellefonte, Caldwell married Martha Jane Snodgrass, a daughter of John Snodgrass (1774-1826), and according to his obituary in *The Scottsboro Citizen*, had “a vast connection in the Snodgrass decedents” (The Scottsboro Citizen 1895).

According to the Jackson County Historical Association, Bellefonte’s town cistern and one store remained until about 1930, while a cornerstone of the old courthouse and portions of the original brick-paved streets were visible (Chambless 2005:13). Remains of a building, variously considered the Bellefonte Inn run by Daniel Martin, the Martin home, or both, stood to the 2000s. All that remains of the buildings on Bellefonte’s square is the Martin building chimney.

3.8.1.2 Identification Survey and Field Findings Summary

New South conducted a search of the online archaeological and architectural records maintained by the University of Alabama's Office of Archaeological Research (OAR) to determine the presence of recorded cultural resources within a one-mile radius of the Project Site, herein referred to as the research radius. Online historic maps and historic aerial photographs, as well as the NRHP listings, were also consulted during the background research. Research was conducted by New South on February 7, 2019.

A search of OAR records revealed 12 archaeological sites within the research radius, four of which (1JA1146, 1JA1147, 1JA1148, and 1JA1150) are within the APE. These sites are summarized in Table 3-8.

Table 3-8. Previously Identified Archaeological Sites with the Research Radius

Site	Cultural Affiliation	Site Type	In APE?	NRHP Recommendation
1JA280	Historic	House	No	Not assessed
1JA281	Historic	Store	No	Not eligible
1JA348	Historic	Cemetery	No	Not assessed
1JA1072	Historic	House site	No	Not eligible
1JA1073	Prehistoric and Historic	Lithic scatter and house	No	Potentially eligible
1JA1144	Historic	Structure	No	Not eligible
1JA1145	Historic	House site	No	Potentially eligible
1JA1146*	Historic	Scatter	Yes	Not eligible
1JA1147	Historic	Historic farmstead	Yes	**Eligible; contributing to BHAD****
1JA1148	Historic	Scatter	Yes	Not eligible
1JA1150	Historic	Historic house	Yes	**Eligible; contributing to BHAD**
1JA1152	Historic	Scatter	No	Not eligible

**Combined with Site 1JA1147*
***Bellefonte Historic Archaeological District*

A search of OAR records revealed 11 architectural resources within the research radius. These resources are summarized in Table 3-9.

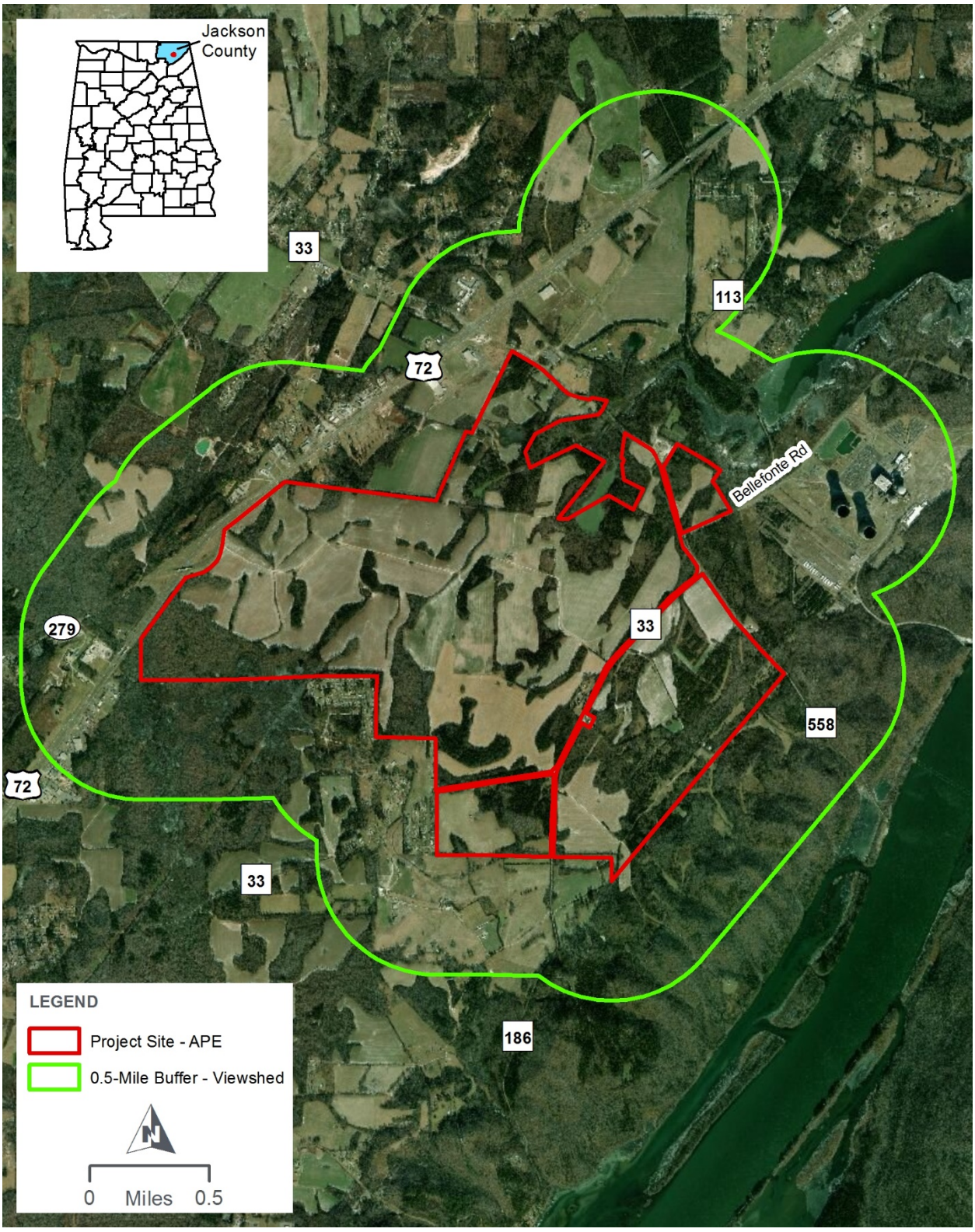

Figure 3-16. Bellefonte Solar Energy Center APE and Viewshed.

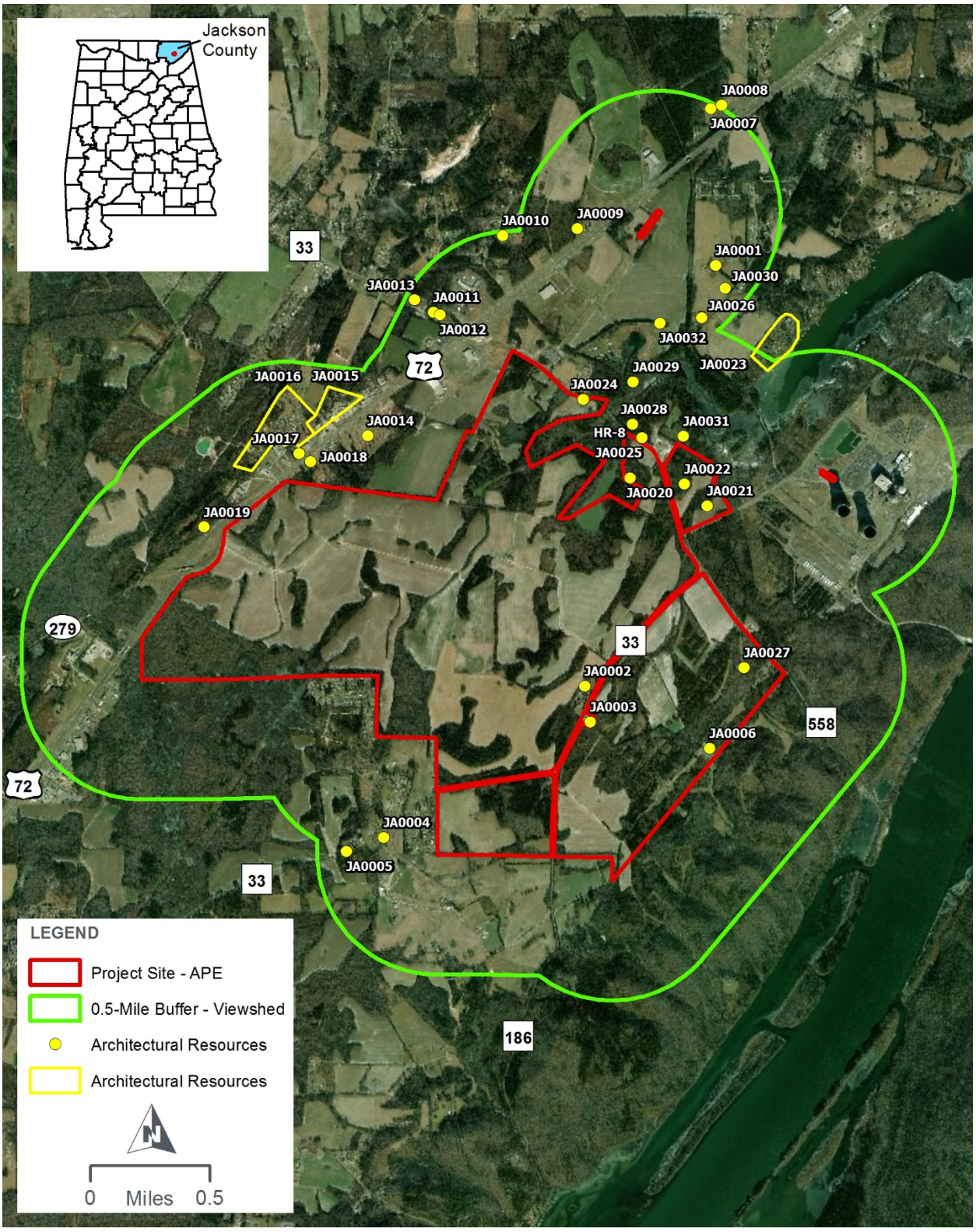

Figure 3-17. Location of previously and newly recorded architectural resources within the Bellefonte Solar Energy Center APE and Viewshed.

Table 3-9. Previously Identified Architectural Resources with the Research Radius.

Survey #	Archaeological Site #	Description	NRHP Recommendation
JA0022	1JA1150	Circa 1880 1.5-story vernacular dwelling; abandoned and in ruins; possibly demolished	Not eligible
JA0023	N/A	Small waterfront district dating circa 1947-1970 and containing approximately 20 properties	Not eligible
JA0024	1JA1226	Circa 1890 Snodgrass Place one-story vernacular dwelling; 13-acre property includes a circa 1890 barn, modern house trailer, tractor shed, and two modern sheds	Eligible (currently recommended Not eligible)
JA0025	N/A	Circa 1900 one-story vernacular dwelling; property features several original outbuildings, including barns, chicken coop, smokehouse, and sheds, as well as a pecan grove; appears to have been demolished	Not eligible
JA0026	N/A	Circa 1965 one-story Minimal Traditional-style dwelling	Not eligible
JA0027	1JA1250	Circa 1880 one-story vernacular log dwelling with square plan; possibly demolished	Not eligible
JA0028	N/A	African-American Bellefonte Cemetery, small segregated burial ground associated with public Bellefonte Cemetery listed on the Alabama Historic Cemetery Registry in 2006	Eligible
JA0029	N/A	Fennell Cemetery, small family burial ground	Eligible
JA0030	N/A	Norwood Cemetery, small family cemetery	Not eligible
JA0031	N/A	No resource description available	Not eligible
JA0032	N/A	Carter-Hansbrough Cemetery, small family cemetery	Eligible

As part of the evaluation process, a Phase I cultural resources survey was conducted by New South Associates (New South) on the Project Site and vicinity from May to August 2019 to determine the presence of archaeological and architectural cultural resources that are listed or eligible for listing in the NRHP (Gregory et al. 2019). The Project Area examined for archaeological resources, referred to herein as the APE, consisted of approximately 1,850 acres, which includes the main block survey area for the solar farm, two small areas for the Hollywood Switching Station and Project Substation, four transmission tower locations, and seven access roads. The Project Area for historic-age architectural resources, referred to herein as the Viewshed, included the APE and the portions of a 0.5-mile radius surrounding the APE that are visually connected by direct line-of-sight, for a total of approximately 5,687 acres (Figure 3-16). Areas within the survey

radius that were determined not to be within view of the Project due to terrain, vegetation, and/or modern built environments, are not considered part of the Viewshed.

Cultural resources identification consisted of background research and architectural and archaeological field surveys. During the archaeological survey, New South investigated 9,008 shovel test locations and recorded a total of 34 new archaeological sites and 17 isolated artifacts within the APE (Table 3-10). Due to their lack of integrity and limited data potential, the 17 isolated finds are unlikely to provide new knowledge about the prehistory or history of Jackson County, and are recommended not eligible for inclusion in the NRHP.

Four previously identified archaeological sites (1JA1146, 1JA1147, 1JA1148, and 1JA1150) were also investigated. The survey resulted in the conflation of 1JA1146 and 1JA1147, two previously recorded contemporaneous historic sites. Following the Phase I survey and investigation of all sites within the APE, New South shared the results and initial recommendations for further work with the involved agencies. Sites 1JA1225 and 1JA1243 received Phase II evaluations.

Twenty-one sites were evaluated as individual resources. Sixteen—1JA1224, 1JA1228, 1JA1229, 1JA1232, 1JA1233, 1JA1234, 1JA1235, 1JA1236, 1JA1239, 1JA1240, 1JA1241, 1JA1244, 1JA1245, 1JA1250, 1JA1252, and 1JA1253 – are recommended not eligible and no further management of these sites is recommended.

Fifteen archaeological sites were evaluated relative to a proposed Bellefonte Historic Archaeological District (BHAD). Six sites – 1JA1147, 1JA1150, 1JA1226, 1JA1227, 1JA1246, and 1JA1248 – are recommended eligible as contributing resources to the district. These sites are recommended for preservation in place through avoidance. If avoidance is not feasible, mitigation of effects to the district would be necessary. In order to ensure avoidance of these sites during the life of the project, the Notice to Proceed (NTP) issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA.

The other nine sites evaluated relative to the BHAD – 1JA1148, 1JA1223, 1JA1225, 1JA1230, 1JA1231, 1JA1247, 1JA1251, 1JA1255, and 1JA1256 – are recommended not eligible as noncontributing resources to the BHAD. The first seven of these will require no further consideration, but 1JA1255 and 1JA1256 are recommended eligible relative to the Civil War Defenses of Bellefonte.

Three sites – 1JA1254, 1JA1255, and 1JA1256 – were evaluated relative to a proposed Civil War Defenses of Bellefonte (CWDB) multiple-resource listing. All three are recommended eligible as contributing resources to the CWDB. These three sites should be preserved in place through avoidance. If avoidance is not feasible, mitigation of effects to the CWBD would be necessary. In order to ensure avoidance of these sites during the life of the project, the NTP issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA.

Three sites –1JA1237, 1JA1238, and1JA1249 – are recommended potentially eligible. Current project plans call for these three sites to be preserved in place. Two sites – 1JA1242 and 1JA1243

– are recommended eligible and should be preserved in place. If avoidance is not feasible, mitigative studies would be necessary. In order to ensure avoidance of these sites during the life of the project, the NTP issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA. Based on this survey, TVA has determined that the APE contains 14 NRHP-potentially eligible or -eligible archaeological sites.

Table 3-10. Newly Recorded Archaeological Sites within the APE

Field ID	Cultural Affiliation	Site Type	NRHP Recommendation
1JA1223	Historic	Historic house	Not Eligible
1JA1224	Prehistoric	Lithic scatter	Not Eligible
1JA1225	Prehistoric / Historic	Temporary camp; historic scatter	Not Eligible**
1JA1226	Historic	Historic houses	**Eligible; contributing to BHAD***
1JA1227	Prehistoric / Historic	Mixed scatter; historic barn	**Eligible; contributing to BHAD**
1JA1228	Historic	Historic house	Not Eligible
1JA1229	Historic	Historic house	Not Eligible
1JA1230	Historic	Corn crib	Not Eligible
1JA1231	Historic	Historic scatter	Not Eligible
1JA1232	Historic	Dump site	Not Eligible
1JA1233	Historic	Historic house	Not Eligible
1JA1234	Historic	Dump site	Not Eligible
1JA1235	Prehistoric / Historic	Temporary camp; historic scatter	Not Eligible
1JA1236	Historic	Lithic scatter	Not Eligible
1JA1237	Prehistoric	Seasonal camp	**Potentially Eligible**
1JA1238	Prehistoric	Seasonal camp	**Potentially Eligible**
1JA1239	Historic	Historic scatter	Not Eligible
1JA1240	Prehistoric	Lithic scatter	Not Eligible
1JA1241	Prehistoric	Lithic scatter	Not Eligible
1JA1242	Historic	Spring house	**Eligible**
1JA1243	Historic	Historic house	**Eligible****
1JA1244	Historic	Dump site	Not Eligible
1JA1245	Historic	Historic house	Not Eligible
1JA1246	Historic	Historic scatter	**Eligible; contributing to BHAD**
1JA1247	Historic	Historic house	Not Eligible
1JA1248	Historic	Historic house	**Eligible; contributing to BHAD**
1JA1249	Prehistoric	Special-use camp	**Potentially Eligible**

Field ID	Cultural Affiliation	Site Type	NRHP Recommendation
1JA1250	Historic	Historic house	Not Eligible
1JA1251	Historic	Dump site	Not Eligible
1JA1252	Historic	Dump site	Not Eligible
1JA1253	Historic	Historic house	Not Eligible
1JA1254	Historic	Civil War Picket	**Eligible; contributing to CWDB*** **
1JA1255	Historic	Civil War Picket	**Eligible; contributing to CWDB**
1JA1256	Historic	Civil War Picket	**Eligible; contributing to CWDB**

**Bellefonte Historic Archaeological District*
***NRHP recommendation based on Phase II evaluation*
****Civil War Defenses of Bellefonte*

During the architectural survey, New South recorded 32 historic-age architectural resources (11 previously recorded and 21 newly recorded) within the Viewshed (Figure 3-17; Table 3-11). Among the newly-recorded resources are 16 dwellings, three farmsteads, two outbuildings, six cemeteries, three neighborhoods, one church, and one commercial establishment. A small number of the residential properties recorded are part of farmsteads, but many are situated on comparatively smaller parcels exclusively for residential use. The majority of the historic-age houses date to the middle twentieth century.

Six of the previously surveyed resources were already determined eligible for the NRHP but two have been demolished and another is in ruins and no longer eligible. The three other previously surveyed resources (JA0028, JA0029, and JA0032) are cemeteries and remain eligible for the NRHP.

Table 3-11. Newly and Previously Recorded Historic-Age Architectural Resources within the Viewshed

Survey #	Address	Description	Previous NRHP Recommendation	Current NRHP Recommendation
JA0022	County Road 33, north of Bellefonte Road	Circa 1880 1.5-story vernacular dwelling	Not eligible	Nonextant; Not eligible
JA0023	Scenic Drive, south of County Road 113 and north of Town Creek	Small waterfront district dating circa 1947-1970 and containing 10 historic properties	Not eligible	Not eligible
JA0024	5119 County Road 33	Snodgrass Place, circa 1890 one-story vernacular dwelling; 13-acre property includes a circa 1890 barn, modern house trailer,	Eligible	Not eligible

Survey #	Address	Description	Previous NRHP Recommendation	Current NRHP Recommendation
		tractor shed, and two modern sheds; Resurveyed, currently ruinous after tree fell on house		
JA0025	County Road 33, south of Bellefonte Cemetery	Circa 1900 one-story vernacular dwelling; Resurveyed, resource either demolished or moved	Eligible	Nonextant; Not eligible
JA0026	743 County Road 113	Circa 1965 one-story Minimal Traditional-style dwelling	Not eligible	Not eligible
JA0027	West of County Road 588, south of County Road 33	Circa 1880 one-story vernacular log dwelling	Eligible	Ruinous, Not eligible
JA0028	North side of County Road 33, south of Town Creek	Bellefonte Cemetery, the public cemetery established for the town of Bellefonte when it was the seat of Jackson County. Burials dating from 1824-1900; TVA surveyed the cemetery in 1936	Eligible	**Eligible**
JA0029	South of County Road 113, north of Town Creek	African American Bellefonte Cemetery, early 19th century cemetery with fieldstone burial markers	Eligible	**Eligible**
JA0030	North side of County Road 113 at River Road	Norwood-Netherland Cemetery, small family cemetery with approximately 12 burials	Not eligible	Not eligible
JA0031	Northeast of County Road 33, south of Town Creek	Unknown cemetery, small family cemetery with approximately 12-15 fieldstone markers	Not eligible	Not eligible
JA0032	North side of County Road 113; west of railroad	Carter-Hansbrough Cemetery, small family cemetery with burials dating from circa 1829 to circa 1837	Eligible	**Eligible**

Survey #	Address	Description	Previous NRHP Recommendation	Current NRHP Recommendation
JA0001	North side of County Road 113 across from River Drive	Jeffery Farm, 1970 Ranch house with five outbuildings	N/A	Not eligible
JA0002	North side of County Road 33 between intersection with County Roads 588 and 186	Robinson House, circa 1969 Ranch house with no style	N/A	Not eligible
JA0003	3370 County Road 33	TNT Outreach Ministries Church, circa 1930 rural church with no style	N/A	Not eligible
JA0004	2234 County Road 33	Maynor House, circa 1960 house with minimal ornamentation	N/A	Not eligible
JA0005	2270 County Road 33	Circa 1840s-1850s Lee Cabins moved to property after 1992; smokehouse moved from Georgia. residence on property built in 1978	N/A	Not eligible
JA0006	South side of Private Road from County Road 186 and County Road 558	Circa 1955 Snodgrass pole barn for livestock	N/A	Not eligible
JA0007	North side of US Highway 72 at Humphrey Lane	Marable House, circa 1970 Ranch house	N/A	Not eligible
JA0008	North side of US Highway 72 at Humphrey Lane	Transouth Contractors; circa 1970 warehouse and office	N/A	Not eligible
JA0009	29970 US Highway 72	Brooks House circa 1965 house	N/A	Not eligible
JA0010	250 Bob Haas Road	Haas-Ledbetter House, circa 1950	N/A	Not eligible
JA0011	5963 Bellefonte Road (CR 33)	Johnson House, circa 1942	N/A	Not eligible
JA0012	5963 Bellefonte Road/County Road 33	Haas Cabin, circa 1840s two single room log cabins moved to this property in 1966-67	N/A	Not eligible

Survey #	Address	Description	Previous NRHP Recommendation	Current NRHP Recommendation
JA0013	5966 Bellefonte Road/County Road 33	Puckett House, circa 1940 Minimal Traditionalist house	N/A	Not eligible
JA0014	28615 US Highway 72	Pinehaven Memorial Gardens, circa 1960, memorial garden-style cemetery	N/A	Not eligible
JA0015	Goat Flats Drive, north side of US Highway 72	Goat Flats Subdivision, platted in 1968	N/A	Not eligible
JA0016	Ridge Road, Crestview Drive, and Tawasentha Circle, north side of US Highway 72	Hollywood Estates subdivision, platted 1964	N/A	Not eligible
JA0017	North side of US Highway 72 southwest of Ridge Road	Bradford-Grider House, circa 1959 house with several outbuildings	N/A	Not eligible
JA0018	28479 US Highway 72	Steele House, circa 1960 one-story house	N/A	Not eligible
JA0019	North side of Highway 72 at East Willow Street	John Snodgrass House, circa 1955 one-story house	N/A	Not eligible
JA0020	Northeast of Bellefonte Road and the intersection with CR 33	Circa 1940 Snodgrass Corn Crib	N/A	Not eligible
JA0021	Northwest of CR 33 near the intersection with Bellefonte Road	Hess Snodgrass Tenant House, circa 1920 one-story, log construction house	N/A	Not eligible

3.8.2 Environmental Consequences

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

3.8.2.1 No Action Alternative

Under the No Action Alternative, no Project related impacts to cultural resources would occur. The landscape in the Project Area would remain relatively unchanged from the present mix of agricultural fields and forested land.

3.8.2.2 Proposed Action Alternative

New South recorded a total of 34 new archaeological sites and 17 isolated artifacts within the APE. The 17 isolated finds are recommended not eligible for inclusion in the NRHP. Four previously identified archaeological sites (1JA1146, 1JA1147, 1JA1148, and 1JA1150) were also investigated. The survey resulted in the conflation of 1JA1146 and 1JA1147, two previously recorded contemporaneous historic sites. Following the Phase I survey and investigation of all sites within the APE, New South shared the results and initial recommendations for further work with the involved agencies. Sites 1JA1225 and 1JA1243 received Phase II evaluations.

Twenty-one sites were evaluated as individual resources. Sixteen sites – 1JA1224, 1JA1228, 1JA1229, 1JA1232, 1JA1233, 1JA1234, 1JA1235, 1JA1236, 1JA1239, 1JA1240, 1JA1241, 1JA1244, 1JA1245, 1JA1250, 1JA1252, and 1JA1253 – are recommended not eligible and no further management of these sites is recommended.

Fifteen archaeological sites were evaluated relative to a proposed BHAD. Six sites – 1JA1147, 1JA1150, 1JA1226, 1JA1227, 1JA1246, and 1JA1248 – are recommended eligible as contributing resources to the district. If avoidance is not feasible, mitigation of effects to the district would be necessary. In order to ensure avoidance of these sites during the life of the project, the NTP issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA. Current project plans call for these six sites to be preserved in place. It is recommended that under current design plans, the project would have no effect to these six sites.

The other nine sites evaluated relative to the BHAD – 1JA1148, 1JA1223, 1JA1225, 1JA1230, 1JA1231, 1JA1247, 1JA1251, 1JA1255, and 1JA1256 – are recommended not eligible as noncontributing resources to the BHAD. The first seven of these will require no further consideration, but 1JA1255 and 1JA1256 are recommended eligible relative to the Civil War Defenses of Bellefonte.

Three sites – 1JA1254, 1JA1255, and 1JA1256 – were evaluated relative to a proposed CWDB multiple-resource listing. All three sites are recommended eligible as contributing resources to the CWDB. These three sites should be preserved in place through avoidance. If avoidance is not feasible, mitigation of effects to the CWBD will be necessary. In order to ensure avoidance of these sites during the life of the project, the NTP issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA. Current project plans call for 1JA1255 to be preserved in place. Under the current design plans, the project would have no effect on 1JA1255. Current project plans would cause land disturbance in the areas of 1JA1254 and 1JA1256. Under the current design plans, the project would have an adverse effect on 1JA1254 and 1JA1256 and mitigation of these adverse effects will be necessary (see below).

Three sites –1JA1237, 1JA1238, and1JA1249 are recommended potentially eligible. Current project plans call for these three sites to be preserved in place. It is recommended that under current design plans, the project would have no effect to these three sites.

Two sites – 1JA1242 and 1JA1243 – are recommended eligible and should be preserved in place. If avoidance is not feasible, mitigative studies would be necessary. In order to ensure avoidance of these sites during the life of the project, the NTP issued by TVA to Bellefonte Solar upon the completion of all environmental reviews will be conditioned on the avoidance of those sites during the term of the PPA. Current project plans call for 1JA1242 to be preserved in place. It is recommended that under current design plans, the project would have no effect to this site. Current project plans would cause land disturbance in the area of 1JA1243. Under the current design plans, the project would have an adverse effect on 1JA1243 and mitigation of these adverse effects will be necessary (see below).

Based on these recommendations on effects, TVA has consulted with the Alabama SHPO and federally recognized Indian tribes and has determined that the Project would result in an adverse effect to sites 1JA1243, 1JA1254, and 1JA1256. Pursuant to 36 CFR Part 800.6(c), TVA is developing a MOA in consultation with the Alabama SHPO to minimize and/or mitigate the effects of 1JA1243, 1JA1254, and 1JA1256. Mitigation would include data recovery and a public outreach component. TVA also notified the Advisory Council on Historic Preservation of the adverse effect finding. In TVA's 2019 letter, TVA stated: "Due to the size and scope of the project TVA proposes to proceed under phases as provided under 36 CFR § 800.4(b)(2) and § 800.5(a)(3)." The Alabama SHPO agreed to this approach.

Based on the results of the architectural survey, TVA finds that, of the 32 previously or newly recorded historic-age properties, three properties (JA0028, JA0029, and JA0032) in the Viewshed remain eligible for listing in the NRHP.

Project activity in the vicinity of JA0028 would consist of the construction of solar arrays approximately 0.32 mile to the southeast and approximately 0.29 mile to the southwest. The visual impact of proposed solar arrays to the southeast and southwest would be nonexistent due to the distance and large areas of mature trees between the historic property and the proposed constructions. The presence of the proposed solar arrays would not impact the design, workmanship, materials, or rural setting of the cemetery. TVA finds that the Project would not diminish the overall integrity of JA0028, and would, therefore, have no adverse effect on the resource.

Project activity in the vicinity of JA0029 would consist of the construction of a solar array approximately 0.5 mile to the southwest. The visual impact of proposed solar array to the southwest would be nonexistent due to the distance and large areas of mature trees between the historic property and the proposed construction. The presence of the proposed solar array would not impact the design, workmanship, materials, or rural setting of the cemetery. TVA finds that the Project would not diminish the overall integrity of JA0029, and would, therefore, have no adverse effect on the resource.

Project activity in the vicinity of JA0032 would consist of the construction of an access road and transmission line tower approximately 0.36 mile to the northwest, as well as a proposed solar array approximately 0.67 miles to the southwest. The visual impact of these constructions to the northwest would be minimal due to the distance, while the visual impact of the proposed solar array to the southwest would be nonexistent due to distance and expanses of mature trees

between the historic property and the proposed solar array. The presence of the proposed access road, transmission line tower, and solar array would not impact the design, workmanship, materials, or rural setting of the cemetery. TVA finds that the Project would not diminish the overall integrity of JA0032, and would, therefore, have no adverse effect on the resource.

Based on these recommendations on effects, TVA has consulted with the Alabama SHPO and federally recognized Indian tribes and has determined that the Project would adversely affect resources 1JA1243, 1JA1254, and 1JA1256. In a letter, dated March 9, 2020, the Alabama SHPO concurred with TVA's eligibility determinations and findings of effect (Appendix D). Bellefonte Solar and TVA are preparing a MOA with Alabama SHPO and Advisory Council of Historic Preservation to mitigate the adverse effect to these resources. TVA received no objections to the project from federally recognized Indian tribes.

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 No Action and Proposed Action Alternatives. Specific utility components analyzed below include telecommunications, electricity, natural gas, water, and sewer.

3.9.1 Affected Environment

The Project Site is located in a rural, unincorporated area of southern Jackson County, Alabama.

3.9.1.1 Telecommunications

Telecommunication services in the Project Area are provided by North Alabama Electric Cooperative as well as mobile providers.

3.9.1.2 Electricity

In the Project Area, electrical service is provided by North Alabama Electric Cooperative through TVA (JCEDA 2019; TVA 2019d). Existing power lines are present in the Project Area along portions of US 72, CR 33, CR 558, and other major and minor roads in the vicinity. TVA's Bellefonte NP-Scottsboro 161-kV TL traverses the western portion of the Project Site in a northeast-southwest orientation.

3.9.1.3 Natural Gas

Natural gas is distributed by the Scottsboro Gas Board, Bridgeport Gas Board, Stevenson Utilities Board, and the Dekalb-Cherokee Gas System. Scottsboro and Dekalb-Cherokee are supplied by Southern Natural Gas, Inc. Bridgeport and Stevenson (via Bridgeport) are supplied by East Tennessee Gas System (JCEDA 2019). However, no natural gas lines or line markers servicing individual customers were observed on the Project Site. Given their proximity to Scottsboro, the residences located adjacent to the southern portion of the Project Site may have natural gas service.

3.9.1.4 Water and Sewer

Due to being predominantly outside of incorporated municipality limits, water service in the Project Area is provided either by the Cumberland Mountain Water Authority (CMWA) or through private wells, and sewer service is provided by private septic systems. However, no water lines or line markers servicing individual customers were observed on the Project Site. Given their respective proximity to Scottsboro and Hollywood, the residences located adjacent to the southern and northern portions of the Project Site may have water service from CMWA.

3.9.2 Environmental Consequences

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

3.9.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, there would be no Project-related impacts to utilities. Existing land use would be expected to remain a mix of agricultural and forested land, and existing onsite utilities would likely remain unchanged, with the exception of potential upgrades and maintenance.

3.9.2.2 Proposed Action Alternative

Under the Proposed Action, installation of the following utility lines would occur: approximately 0.1 miles of new gen-tie line and approximately 5.2 miles of high-strength steel ground wire would be replaced by new overhead fiber-optic ground wire, as discussed in Section 2.2.

Electrical service to the Bellefonte Solar Energy Center would be provided by North Alabama Electric Cooperative, and North Alabama Electric Cooperative would coordinate with customers if outages were necessary. As discussed previously, if determined necessary, the Project may include an operations and maintenance building and supporting Project water service components, which could include water wells, a septic system, or a pump-out septic holding tank.

Due to the installation of utility lines, there may be short-term adverse impacts to local utilities such as electricity connections when bringing the solar facility on-line or during routine maintenance of the facility. No long-term adverse impacts are expected to be associated with the Project. Implementation of the Proposed Action would result in additional renewable energy resources in the region and would, thus, constitute a beneficial impact to electrical services across the region.

3.10 WASTE MANAGEMENT

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

3.10.1 Affected Environment

"Hazardous materials" and "hazardous waste" are substances which, because of their quantity, concentration, or characteristics (physical, chemical, or infectious), may present a significant danger to public health and/or the environment if released. These substances are defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 U.S.C. §§ 9601 *et seq.*) and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act ([RCRA]; 42 U.S.C. §§ 6901 *et seq.*). Regulated hazardous wastes under RCRA include any solid, liquid, contained gaseous, or semisolid waste or combination of wastes that exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or is listed as a hazardous waste under 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.

An American Society for Testing and Materials (ASTM) standard E 1527-13 Phase I Environmental Site Assessment (ESA) will be performed in November 2019 to evaluate the presence, former use, or spillage of hazardous substances or petroleum products, also referred to as recognized environmental conditions (RECs), on the entirety of the 14 individual parcels totaling approximately 1,850 acres that encompass the Project Site. As part of the Phase I ESA, HDR will contract Environmental Data Resources, Inc. to search federal, state, local, and tribal databases for pertinent environmental records related to the Project Site or within standard ASTM E 1527-13 search distances of the Project Site. HDR will review the database results prior to conducting a field reconnaissance of the Project Site and surrounding area to evaluate potential presence of RECs that may affect the Project.

Collection and disposal of solid waste in Jackson County is conducted by the Jackson County Department of Sanitation. Nonhazardous wastes, including construction wastes, can be hauled to an operating Class I facility. Various vendors offer hazardous waste removal.

3.10.2 Environmental Consequences

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

3.10.2.1 No Action Alternative

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

3.10.2.2 Proposed Action Alternative

Under the Proposed Action, storage and use of liquid materials in the form of petroleum-based oils and fuels, and generation of liquid and solid wastes in the form of used oil, construction debris, packing materials, and general construction waste would occur.

Materials Management

During construction of the proposed solar facility, materials would be stored on site in storage tanks, vessels, or other appropriate containers specifically designed for the characteristics of these materials. The storage facilities would include secondary containment in case of tank or vessel failure. Construction and decommissioning-related materials stored on site would primarily be liquids such as used oil, nitrogen, diesel fuel, gasoline, hydraulic fluid, and other lubricants associated with construction equipment. Safety Data Sheets for all applicable materials present on site would be made readily available to onsite personnel.

Fueling of some construction vehicles would occur in the construction area. Other mobile equipment would return to the onsite laydown areas for refueling. Special procedures would be identified to minimize the potential for fuel spills, and spill control kits would be carried on all refueling vehicles for activities such as refueling, vehicle or equipment maintenance procedures, waste removal, and tank clean-out. A fuel truck may be stored on site for approximately 20 months during construction of the Project. The total volume of the onsite tanks would exceed 1,320 gallons, the threshold above which a Spill Prevention, Countermeasure and Control (SPCC) plan may be required (40 CFR part 112). The facility would fall under USEPA's SPCC requirements for "oil-filled operational equipment" and a Tier I Qualified Facility; therefore, no double-walled protection would be required, and the SPCC plan would not have to be certified by a Professional Engineer (USEPA 2006) (USEPA 2011). The SPCC plan would be prepared prior to construction to prevent oil discharges during facility operation.

During operation, bulk chemicals would be stored in storage tanks; other chemicals would be stored in returnable delivery containers. Chemical storage areas would be designed to contain leaks and spills. The transport, storage, handling, and use of chemicals would be conducted in accordance with applicable laws, ordinances, regulations, and standards. While the various transformers would contain oil, there would be no separate oil or hydraulic fluid stored on site related to transformers. The quantities of these 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.

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. Flammable materials (e.g., paints, solvents) would be stored in flammable material storage cabinet(s) with built-in containment sumps. Due to the small quantities involved and the controlled environment, a spill could be cleaned up without significant environmental consequences.

Bellefonte Solar 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.

Waste Management

Construction of the Proposed Action is estimated to result in the generation of approximately 42,000 cubic yards of solid waste (1,050 loads at 40 cubic yards each), consisting of construction debris and general trash, including pallets and flattened cardboard module boxes. Bellefonte Solar estimates that approximately 2,990 flatbed truck loads would be required for hauling equipment and removing waste during construction.

Information on universal wastes anticipated to be generated during Project construction is provided in Table 3-12.

Table 3-12. Summary of construction waste streams and management methods.

Waste stream	Origin and composition	Estimated frequency of generation	Onsite treatment	Waste management method/offsite treatment
Construction waste	Empty material containers	Intermittent	None	Return to vendor
Construction waste	Used oil, hydraulic fluid, oily rags	Intermittent	None	Recycle, remove to offsite disposal location
Construction waste	Steel, glass, plastic, wood/pallets, cardboard, paper	Intermittent	None	Recycle wherever possible, otherwise dispose to Class I landfill
Sanitary waste	Portable chemical toilets – sanitary waste	Periodically pumped to tanker truck by licensed contractors	None	Ship to sanitary wastewater treatment plant

The anticipated quantities of waste produced during Project operation are summarized in Table 3-13. Universal wastes and unusable materials produced as a result of implementation of the Proposed Action would be handled, stored, and managed in accordance with Alabama Universal Waste requirements.

Table 3-13. 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-petroleum-related wastes	Tracker drives, hydraulic equipment	1,000 gallons/year	Intermittent	Accumulate for <90 days	Recycle

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- petroleum-related wastes	Various	One 55-gallon drum/month	Intermittent	Accumulate for <90 days	Sent off site for recovery or disposed at Class I landfill
Spent batteries	Lead acid/lithium ion	1,000	Every 10 years	Accumulate for <90 days	Recycle

Waste collection and disposal would be conducted in accordance with applicable regulatory requirements to minimize health and safety effects. To the extent possible, waste will be recycled. Materials that cannot be recycled would be disposed of at an approved facility to be determined by the designated contractor(s). No waste oil would be disposed of on the Project Site.

If necessary, Bellefonte Solar or its contractor would obtain a hazardous waste generator identification number from the State of Alabama prior to generating any hazardous waste. Any spills related to the Project would be reported to ADEM. A sampling and cleanup report would be prepared for the Project Site and sent to ADEM to document each spill and clean up. Each spill, regardless of amount, would be cleaned up within 48 hours and a spill report would be completed. Copies of any spill and cleanup reports would be kept on site.

Designated contractor and subcontractor personnel would be responsible for daily inspection, cleanup, and proper labeling, storage, and disposal of all refuse and debris produced. Disposal containers such as dumpsters or roll-off containers would be obtained from a proper waste disposal contractor. Records of the amounts generated would be provided to the designated Bellefonte Solar Energy Center environmental specialist.

Wastewater

If determined necessary, the Project may include an operations and maintenance building and supporting Project water service components, which could include water wells, a septic system, or a pump-out septic holding tank. Permanent toilets would be installed in the operations and management building. These toilets would be connected to a Project septic system adjacent to the building. The septic system and toilets would not be located within 100 feet of any stream or wetland and would be designed based on other local requirements. No adverse effects would be anticipated from wastewater treatment and disposal associated with the permanent toilets and associated septic system.

3.11 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

This section describes an overview of existing public health and safety at the Project Site and the potential impacts to public health and safety associated with the No Action and Proposed Action

Alternatives. Analyzed issues include emergency response and preparedness and occupational, or worker, safety in compliance with OSHA standards.

3.11.1 Affected Environment

The Project Site is currently private property, and agricultural and undeveloped land uses dominate. Public emergency services in the area include urgent care clinics, hospitals, law enforcement services, and fire protection services. The Scottsboro Urgent Care Center, located on US 72, approximately 3.2 miles (seven minutes) southwest of the Project Site, is the closest urgent care center to the Project Site. The Highlands Medical Center is the closest hospital, located in Scottsboro approximately 4.5 miles (10 minutes) southwest of the Project Site. Law enforcement services in the Town of Hollywood are provided by the Hollywood Police Department. Jackson County law enforcement services are provided by the Jackson County Sheriff's Department in Scottsboro, approximately 3.5 miles (seven minutes) from the Project Site. The Hollywood Police Department is located in Hollywood, approximately 0.3 mile (one minute) from the Project Site. Fire protection services are provided by the Hollywood Fire Department and the Scottsboro Fire Department, located approximately 0.3 mile (one minute) and 3.5 miles (seven minutes), respectively, 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.

3.11.2 Environmental Consequences

This section describes the potential impacts to public and occupational health and 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 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 agricultural, rural-residential, and forested land, and existing public health and safety issues would be expected to remain as they are at present.

3.11.2.2 Proposed Action Alternative

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

Potential public health and safety hazards could result from increased traffic on roadways due to construction of the Project. Residential and other human use areas along roadways used by construction traffic to access the Project Site would experience increased commercial and

industrial traffic. Awareness of these residences and establishment of traffic procedures to minimize potential safety concerns would be addressed in the health and safety plans followed by construction contractor(s).

Approximately 2,500 gallons of fuel for vehicles would be kept on site in storage tanks during construction of the proposed solar facility. An SPCC plan would be implemented to minimize the potential of a spill and to instruct onsite workers on how to contain and clean up any potential spills. The perimeter of each grouping of Project elements would be securely fenced during construction and for the duration of operation, and access gates would normally remain locked. General public health and safety would not be at risk in the event of an accidental spill on site. Emergency response for the Project Site would be provided by the local, regional, and state law enforcement, fire, and emergency responders, as described in the prior section.

No public health or safety hazards would be anticipated as a result of operation. 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 at and near the Project Site and the potential impacts on transportation resources that would be associated with the No Action and Proposed Action Alternatives. Components of transportation resources that are analyzed include roads, traffic, railroads, and airports.

3.12.1 Affected Environment

3.12.1.1 Roads

The Project Area considered for transportation is located partially within the incorporated limits of the Town of Hollywood and partially in an unincorporated portion of southern Jackson County, Alabama, approximately three miles northeast of the City of Scottsboro. The northern terminus of the Project Site is 0.2 mile from the intersection of US 72 and CR 33. US 72 is a four-lane roadway with a two-way left-turn lane that extends northeast-southwest and is adjacent to the western portion of the Project Site (Figure 2-1). SR 279 is an east-west oriented, paved state highway traversing through the City of Scottsboro. SR 279 stretches between SR 79 and US 72, located just 0.1 mile west of the western portion of the Project Site.

Several local roads extend through and, thus, provide access to the Project Site. CR 33 is a two-lane, paved public road that extends northwest-southeast adjacent to the northern portion of the Project Site until its intersection with CR 558, where it extends northeast-southwest, bisecting the central portion of the Project Site. CR 186 is a two-lane, paved public road that extends north-south and bisects the southern portion of the Project Site until its intersection with CR 33. There are also several unnamed, gravel local roads that extend through the Project Site.

3.12.1.2 Road Traffic

Existing traffic volumes on roads in the Project Area were determined using Average Annual Daily Traffic (AADT) counts measured at existing Alabama Department of Transportation (ALDOT)

stations (ALDOT 2017). The 2017 AADT count for Station 558, located on US 72 adjacent to the western boundary of the Project Site, consisted of 15,070 vehicles. The 2017 AADT count for Station 1329, located on the SR 279 on-ramp to US 72 East, adjacent to the western boundary of the Project Site, consisted of 1,720 vehicles. The 2017 AADT count for Station 6, located along SR 279 approximately 0.16 mile from the Project Site, consisted of 3,530 vehicles. At Station 5, located on SR 279 approximately 0.66 mile west of the Project Site, there were 4,020 daily vehicles in 2017. Station 528, located on US 72 approximately one mile southwest of the Project Site, experienced 16,920 vehicles daily in 2017.

3.12.1.3 Rail and Air Traffic

The closest rail line is operated by Norfolk Southern and is located approximately 0.7 mile west of the Project Site. The closest general aviation airport is the Scottsboro Municipal Airport in Scottsboro, located approximately one mile southwest of the Project Area. The airport consists of one runway 5,250 feet long. The closest regional airport is the Albertville Regional Airport in Albertville, located approximately 36 miles southwest of the Project Area. The airport consists of one runway 6,114 feet long. The closest major airport is the Huntsville International Airport in Huntsville, approximately 45 miles west of the Project Area. The airport has two runways, both with lengths of 10,000 feet or more.

3.12.2 Environmental Consequences

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

3.12.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no Project related impacts on transportation resources would result. Existing land use would be expected to remain a mix of agricultural, rural-residential, and undeveloped forested land, and the existing transportation network and traffic conditions would be expected to remain as they are at present.

3.12.2.2 Proposed Action Alternative

The construction and operation of the Project would have no effect on operation of the airports in the region. The operation of the Project would not affect commercial air passenger traffic or freight traffic in the region and would not adversely affect any aerial crop dusters operating in the vicinity of the Project Site.

During construction of the proposed solar facility, a crew of approximately 150 to 500 people would be present at the Project Site between sunrise and sunset, seven days a week. A majority of these workers would likely come from the local area or region. Other workers would come from outside the region, and many would likely stay in local hotels in the vicinity. It is anticipated that workers would drive personal vehicles to the Project Site. Some of the individual workers and work teams would likely visit local restaurants and other businesses during the construction phase

of the Project. Additional traffic due to deliveries and waste removal would consist of approximately five vehicles per day during construction, as discussed in more detail below.

Traffic flow around the Project Site would be heaviest at the beginning of the work day, at lunch, and at the end of the work day. Deliveries and most workers would likely access the Project Site from the west on US 72. Several businesses are present alongside US 72 in the vicinity of the Project Site. Some traffic to the Earnest Pruett Center of Technology on US 72, Hollywood Elementary School on CR 33, and Scottsboro High School on US 72 would likely travel east and west on US 72, west of the Project Site. Should substantial traffic congestion occur, Bellefonte Solar would implement staggered work shifts during daylight hours to assist traffic flow near Project Site access locations. Implementation of such mitigation measures would minimize potential adverse impacts to traffic and transportation to negligible levels.

Construction equipment and material delivery and waste removal would require approximately 20 flatbed semi-trailer trucks or other large vehicles visiting the Project Site each day during the 20-month construction period. The Project Site can be accessed via routes that do not have load restrictions. These vehicles should be easily accommodated by existing roadways; therefore, only minor impacts to transportation resources in the Project Area would be anticipated as a result of construction vehicle activity.

Several onsite access roads would be maintained on the Project Site. Access points during construction include US 72 across from Dump Road, CR 558 near the intersection with CR 33, CR 558 near the eastern boundary of the Project Site, CR 33 approximately 0.25-mile north of Cedar Glade Baptist Church, CR 33 approximately 0.1-mile south of the church, CR 33 near the intersection with Belle Drive, CR 33 near the intersection with CR 186, and CR 186 just south of CR 33. Following construction, the compacted gravel roads would be maintained to allow access for inspection and maintenance activities. However, these roads would be closed to the public. Permanent access to the Project Substation and Hollywood Switching Station would be off of US 72 and CR 33.

Due to the proximity of the Project Site to the town of Hollywood and the City of Scottsboro, possible minor traffic impacts along US 72, SR 279, and CR 33 could occur, as workers could potentially commute to the Project Site from Scottsboro. However, the proposed workforce would consist of a maximum of 500 employees for only part of the construction period; therefore, the addition of these vehicles to the existing traffic on US 72, SR 279, and CR 33 would be considered moderate temporary impacts. However, use of mitigation measures, such as posting a flag person as discussed above, would minimize potential adverse impacts to traffic and transportation to minor or negligible levels.

The Bellefonte Solar Energy Center would be staffed by up to six full-time workers who would live in the area. The addition of vehicles for full-time staff on local roadways would be accommodated by existing infrastructure; therefore, the operation of the Project would not have a noticeable impact on the local roadways.

Overall, direct impacts to transportation resources associated with implementation of the Proposed Action would be anticipated to be minor to moderate and minimized or 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 in the Project Area, and the potential impacts to socioeconomic conditions that would be associated with the No Action and Proposed Action Alternatives. Components of socioeconomic resources that are presented include population, employment, and income.

3.13.1 Affected Environment

The proposed solar facility would be located partially within the incorporated limits of the Town of Hollywood and partially in an unincorporated portion of southern Jackson County, Alabama. The Project Site overlaps U.S. Census Bureau (USCB) 2010 Census Tract (CT) 9506 and CT 9509 (Figure 3-18). Generally, 2010 CT 9506 encompasses central to southern portions of Jackson County and includes portions of northern Scottsboro, western Skyline, and most of Hollywood, and 2010 CT 9509 comprises the northern shoreline of northern portions of Guntersville Lake, which is primarily residential, agricultural, and undeveloped and does not include any towns or cities. The portion of 2010 CT 9506 that overlaps the Project Site is approximately 141 acres, or 0.2 percent of the entire area of 2010 CT 9506, and the portion of 2010 CT 9509 that overlaps the Project Site is approximately 1,709 acres, or 6.9 percent of 2010 CT 9509's total area. In 2017, USCB modified the boundaries of CT 9506 and CT 9509. As a result, the Project Site completely overlaps 2017 CT 9509 and occupies approximately 7.4 percent of 2017 CT 9509's total area.

3.13.1.1 Population and Demographics

The population of Jackson County, as reported in the 2010 USCB decennial census (2010 Census), was 53,227 (USCB 2019). The Alabama State Data Center (2019) projects that the population of Jackson County will increase by approximately 9.7 percent by 2040. However, based on current trends, population increases would likely concentrate in portions of the county outside the Project Area. Population trends for each associated CT, as compared with Jackson County and the state, are presented in Table 3-14.

Table 3-14. Population trends in the Project Area, county, and state.

Geography	2010 Census	2017 ACS	Percent Change 2010-2017	Projection 2040	Percent Change 2017-2040
CT 9506	5,951	n/a*	n/a	--	--
CT 9509	5,613	5,599	-0.3	--	--
Jackson County	53,386	52,326	-1.2	49,384	-5.6
Alabama	4,779,736	4,850,771	1.5	5,319,305	9.7

*"n/a" indicates data that is not relevant to the Project; "--" indicates that no data is available
Sources: Alabama State Data Center 2019; USCB 2019

The population of Jackson County and 2017 CT 9509 had higher median ages (43.0 and 52.1, respectively) than the state as a whole (38.7), according to the 2017 ACS (USCB 2019). CT 9509 had a higher percentage of people who were at least high school graduates (88.1 percent) than across the county (81.4 percent) and the state (85.3 percent). Higher percentages of people in the Project Area (95.7 percent) maintained the same residence as the year prior than in the county (93.0 percent) or Alabama as a whole (85.8 percent).

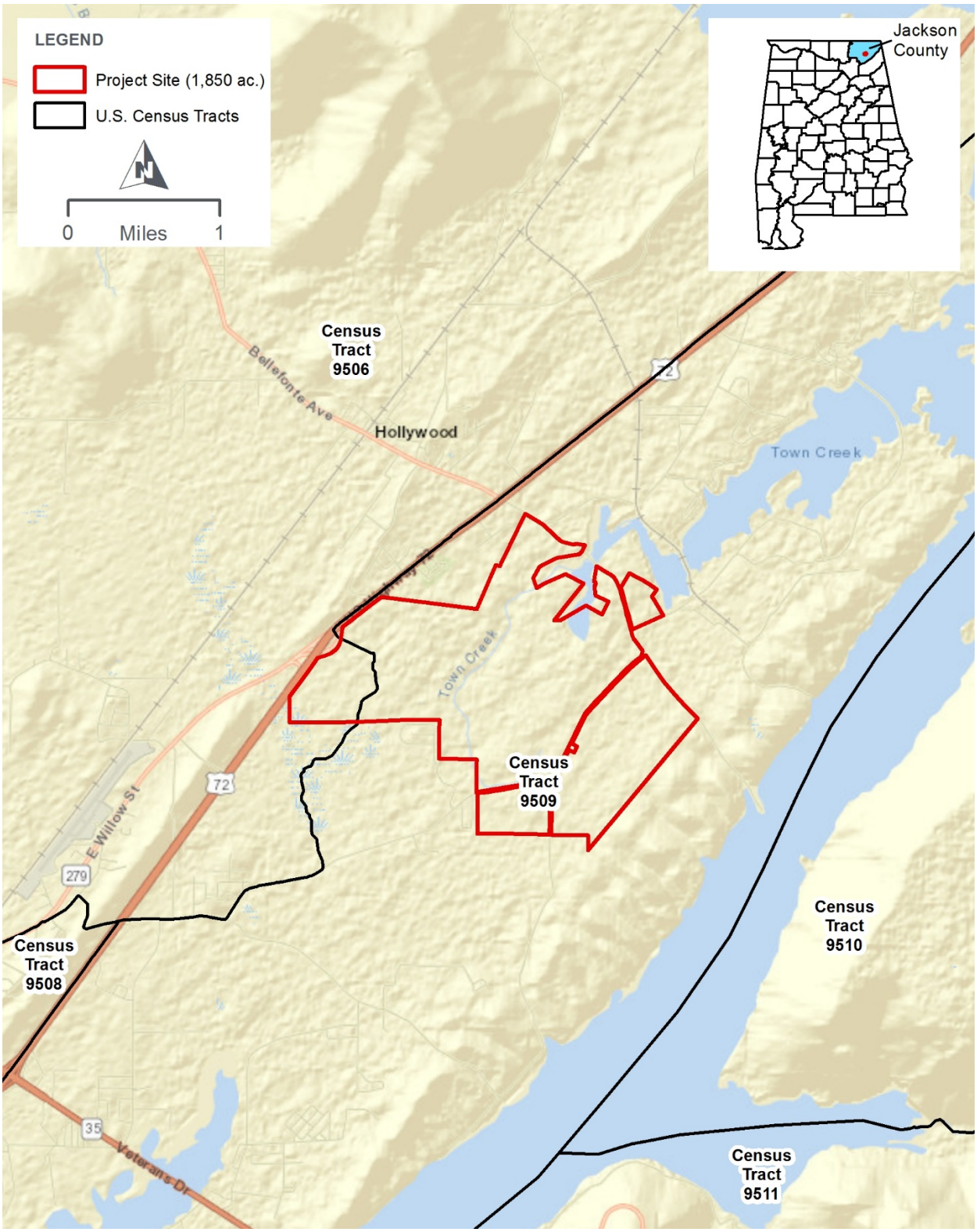

Figure 3-18. 2010 U.S. Census Bureau census tracts in the Project Area

3.13.1.2 Employment and Income

According to the Alabama Department of Labor, Jackson County had a total employment of approximately 22,945 jobs in August 2019 (Table 3-15). The 2019 unemployment rate for Jackson County was 3.0 percent, representing a 1.3 point decrease since August 2018. This rate is slightly higher than the August 2019 state unemployment rate of 2.8 percent. According to the 2017 ACS, the median household income for Jackson County was $39,281, which was less than the state and the nation as a whole ($46,472 and $57,652, respectively). The median household income for 2017 CT 9509 ($49,133) was higher than the county and state.

Table 3-15. Employment and income in the Project Area, county, and state.

Geography	2019 Employment	2019 Unemployment Rate	Median Household Income, 2017 ACS
CT 9509	--	--	$49,133
Jackson County	22,945	3.0	$39,281
Alabama	2,184,511	2.8	$46,472

Source: Alabama Department of Labor 2019; USCB 2019.
Alabama Department of Labor employment data is preliminary and seasonally adjusted at state level.

3.13.2 Environmental Consequences

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

3.13.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no socioeconomic effects from the Project would occur. Existing land use would be expected to remain a mix of agricultural, rural-residential, and undeveloped forested land, and existing socioeconomic conditions would be expected to remain as they are at present or change at approximately the current rate.

3.13.2.2 Proposed Action Alternative

Under the Proposed Action, a new solar facility would be built in the Project Area. Construction activities at the Project Site would take approximately 20 months to complete with a crew of approximately 150 to 500 workers at the site, depending on construction activities. Workers would include general laborers and electrical technicians. Work would generally occur seven days a week during daylight hours. Short-term beneficial economic impacts would result from construction activities associated with the Project, including the purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers were obtained. It is likely some construction materials and services would be purchased locally in Jackson County and/or in adjacent counties. Most of the other components of the solar and transmission facilities would be acquired from outside the local area. Also, most of the construction workforce would be sought

locally or within the region, while a small portion of the construction workforce might come from out of the region. The direct impact to the economy associated with construction of the Project 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 Project could have minor beneficial indirect impacts to population and short-term employment and income levels in Jackson County.

During operation of the solar facility, a full-time workforce of up to six people would be on site five days a week from 7 A.M. to 5 P.M. This workforce would manage and maintain the Bellefonte Solar Energy Center and conduct regular inspections. Grounds maintenance and some other operation and maintenance activities may be conducted by local contractors. Therefore, operation of the solar facility would have a small positive impact on employment and population in Jackson County.

Overall, socioeconomic impacts for the operation of the proposed solar facility would be positive and long-term, but 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 Jackson County and the vicinity. Additionally, the local governments would not have to provide any of the traditional government services typically associated with a large capital investment, such as water, sewer, or schools.

3.14 ENVIRONMENTAL JUSTICE

This section describes an overview of environmental justice considerations within the Project Area and the potential impacts to environmental justice populations that would be associated with the No Action and Proposed Action Alternatives. Components of environmental justice that are presented include the proportions of the local population that are minority and low-income and the potential for effects to these populations.

3.14.1 Affected Environment

Environmental justice-related impacts are analyzed in accordance with EO 12898 to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority and low-income populations. While not subject to this EO, TVA routinely considers environmental justice in its NEPA review processes.

Council of Environmental Quality (CEQ) guidance directs identification of minority populations when either the minority population of the affected area exceeds 50 percent or the minority population percentage of the study area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). CEQ defines minority populations as people who identify themselves as Asian or Pacific Islander, American Indian or Alaskan Native, Black (not of Hispanic origin), or Hispanic. Due to including one of these minorities, those indicating two or more races are also considered minorities. Minority populations were defined as those exceeding 50 percent.

CEQ guidance specifies that low-income populations are to be identified using the annual statistical poverty threshold from the USCB Current Population Reports Series P-60 on Income and Poverty. The USCB-provided 2017 poverty threshold for individuals under age 65 was $12,752, and the official poverty rate for the United States as a whole in 2017 was 12.3 percent (USCB 2018). Due to availability, low-income populations were defined as those with poverty rates estimated for all people that are above the U.S. poverty rate of 12.3 percent.

Based on CEQ guidance, USCB data reported in the 2017 ACS were used to identify minority and low income populations in the Project Area. As discussed in more detail in Section 3.13.1, the Project Site overlaps approximately 7.4 percent of USCB 2017 CT 9509's total area and approximately 16.4 percent of Block Group (BG) 1, within CT 9509.

3.14.1.1 Minority Population

As of the 2017 ACS, minorities constituted approximately 9 percent of the total population in Jackson County (Table 3-16). This percentage is lower than the state minority percentage of 31.6. In the Project Area, BG 1, CT 9509 had a minority population of 5.7 percent, lower than the county, state, and nation. According to the USEPA EJSCREEN, an environmental justice screening and mapping tool, on the Project Site and within a 1-mile radius of the Project Site, the minority population is estimated to be 9 percent (USEPA 2019d). While the USCB and USEPA findings differ, both indicate a minority population in the Project Area that is lower than the 50 percent threshold noted as significant in CEQ guidance.

Table 3-16. Minority population in the Project Area, county, and state.

Geography	Minority Population	% Minority Population
Block Group 1, CT 9509	59	5.7
Jackson County	4,698	9.0
Alabama	1,562,029	31.6

Source: USCB 2019

3.14.1.2 Poverty

Based on the 2017 ACS, the poverty rate for all people in Jackson County was 19 percent (Table 3-17). The Project Site had an estimated poverty rate of 10.3 percent. This poverty rate is lower than the rates of the county, state, and nation. Similarly, the per capita income of all people on and near the Project Site ($28,262) is higher than the county and state. According to the USEPA EJSCREEN, on the Project Site and within a 1-mile radius of the Project Site, the low-income population is estimated at 37 percent (USEPA 2019d).[1] This rate is lower than the county as a whole.

[1] EJScreen defines low-income populations as "Percent of individuals whose ratio of household income to poverty level in the past 12 months was less than two (as a fraction of individuals for whom ratio was determined)." The source of the minority data in EJScreen is USCB 2012 to 2016 ACS 5-Year Estimates.

Table 3-17. Poverty in the Project Area, county, and state.

Geography	Per Capita Income, All People	Poverty Rate, Families	Poverty Rate, All People
CT 9509	$28,262	6.2	10.3
Jackson County	$20,946	15.5	19.0
Alabama	$25,746	13.6	18.0

Source: USCB 2019

3.14.2 Environmental Consequences

This section describes the potential impacts on environmental justice populations should the Proposed Action or No Action Alternative be implemented. According to 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 Alternative

Based on the analyses presented in Section 3.14.1, including the results of the USEPA EJSCREEN analyses, minority and low-income populations are present in the Project Area at lower rates than the county and state. In regards to low-income status, the Project Site has an estimated poverty rate that is lower than the official U.S. poverty rate of 12.3 percent.

The overall impacts of the proposed Bellefonte Solar Energy Center, as described in other sections in this chapter, most of which would occur during the 20-month construction period, would be minor, and offsite impacts would be negligible. As such, no disproportionately high or adverse direct or indirect impacts on minority or low-income populations due to human health or environmental effects are expected to result from the Proposed Action.

CHAPTER 4

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND CUMULATIVE IMPACTS

This chapter summarizes the anticipated adverse environmental impacts of the Project and considers the relationship between short-term uses and long-term productivity and whether the Project makes irreversible and irretrievable commitments of resources. This chapter also considers the cumulative impacts in relation to other ongoing or reasonably foreseeable proposed activities within the Project Area.

4.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

The Proposed Action could cause some unavoidable adverse environmental effects (see Table 2-2). Specifically, construction activities would temporarily increase noise, traffic, and health and safety risks and temporarily affect air quality, GHG emissions, and visual aesthetics of the Project Site vicinity. Construction activities would primarily be limited to daytime hours, which would minimize noise impacts. Temporary increases in traffic would be minimized or mitigated by instituting staggered work shifts and/or posting a flag person during the heavy commute periods. Temporary increases in health and safety risks would be minimized by implementation of the Project health and safety plan. Construction and operations would have minor, localized effects on soil erosion and sedimentation that would be minimized by soil stabilization and vegetation management measures. Selective maintenance of tree buffers and/or fence screening along the perimeter of the solar facility would minimize effects to visual resources, during both construction and operation. The Project would change land uses on the Project Site from primarily agricultural to solar uses, where these practices are not presently occurring; however, solar power as a land use type is considered a special exception in this portion of Jackson County.

With the application of appropriate BMPs, no unavoidable adverse effects to groundwater are expected. Long-term habitat loss would occur due to alteration of land use on 997 acres of the Project Site. Revegetation of the Project Site with native and/or noninvasive grasses and herbaceous vegetation would help minimize effects to open, grassy habitats. The Project is not expected to adversely affect any federal or state-listed species. Potential summer roosting habitat for federally listed NLEB, gray bat, and Indiana bat would be removed between November 15 and March 31, when these bats are roosting outside of the Project Area. Consultation with the USFWS under Section 7 of the ESA was conducted and concurrence was received on January 30, 2020. Coordination with USDA-APHIS would occur if construction activities occur within 660 feet of active osprey nests.

4.2 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and uses of water resources. Long-term productivity is the capability of the land to provide resources, both market and nonmarket, for future generations. In this context, long-term impacts to site productivity would be those that last beyond the life of the Project. The Proposed Action would affect short-term uses of the Project Site by converting it from agricultural and undeveloped land to solar power generation. The effects on

long-term productivity would be minimal, as existing land uses could be readily restored on the Project Site following the decommissioning and removal of the solar facility.

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible or irretrievable commitment of resources would occur when resources would be consumed, committed, or lost because of the Project. The commitment of a resource would be considered irretrievable when the Project would directly eliminate the resource, its productivity, or its utility for the life of the Project and possibly beyond. Construction and operation activities would result in an irretrievable and irreversible commitment of natural and physical resources. The implementation of the Proposed Action would involve irreversible commitment of fuel and resource labor required for the construction, maintenance, and operation of the solar energy system. Because removal of the solar arrays and associated onsite infrastructure could be accomplished rather easily, and the facility would not irreversibly alter the site, the Project Site could be returned to its original condition or used for other productive purposes once the solar facility is decommissioned. Most of the solar facility components could also be recycled after the facility is decommissioned.

4.4 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 action in the vicinity.

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

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

The proposed Project would result in minor direct impacts to land use, geological resources and farmlands, water resources, biological resources, visual resources, noise, air quality, cultural resources, public health and safety, and transportation.

4.4.1 FEDERAL PROJECTS

This section addresses other projects with possible effects to land use, geological resources and farmlands, water resources, biological resources, visual resources, noise, air quality, public health and safety, and transportation.

Seven projects were identified in Jackson County having at least partial federal funding, with the closest project located approximately three miles from the Project Site. These are transportation projects and have federal funding and additional funding from either the State or County. The projects include bridge rehabilitation, intersections improvements, and resurfacing of existing roadways. The nearby project is a resurfacing project in Pisgah, east of the Tennessee River. Considering that the project would involve the resurfacing of an existing roadway and given the nature of the impacts of the proposed Bellefonte Solar Energy Center, the Proposed Action is unlikely to contribute to cumulative adverse effects to the same resources affected by these federally funded projects.

4.4.2 STATE AND LOCAL PROJECTS

The Project Area is within both the Town of Hollywood and unincorporated Jackson County, but is largely rural and agricultural. Aside from the previously discussed County and State projects with federal funding, there are no known recent or planned state and local projects in the Project Site vicinity. Therefore, the Proposed Action would not contribute to cumulative adverse effects to the same resources affected by any state or local projects.

CHAPTER 5

5 LIST OF PREPARERS

5.1 PROJECT TEAM

Table 5-1 presents the members of the Project team and summarizes the expertise of each member and their contributions to this EA.

Table 5-1. Bellefonte Solar Energy Center Environmental Assessment Project Team

Name/Education	Experience	Project role
TVA		
Elizabeth Smith B.A., Environmental Studies and Geography	10 years in environmental policy and NEPA compliance	NEPA Project Manager and Coordinator
Payten Taylor Butler		
Adam Dattilo M.S., Forestry; B.S., Natural Resource Conservation Management	20 years in ecological restoration and plant ecology, 15 years in botany	Vegetation, threatened and endangered species (plants)
Elizabeth B. Hamrick M.S., Wildlife and Fisheries Science; B.A., Biology; B.A., Anthropology	19 years conducting field biology, 8 years in biological compliance, NEPA compliance, and ESA consultation for T&E terrestrial animals	Wildlife, threatened and endangered species (terrestrial animals)
Michaelyn Harle Ph.D., Anthropology; M.A., Anthropology; B.A., Anthropology	16 years in cultural resource management	Cultural resources, NHPA Section 106 compliance
Kim Pilarski-Hall M.S. and B.S., Geography, Minor in Ecology	21 years in wetlands assessment and delineation	Biological resources
A. Chevales Williams B.S., Environmental Engineering	14 years in water quality monitoring and compliance, 13 years in NEPA planning and environmental services	Permits and compliance – surface water and erosion
Carrie Williamson, P.E., CFM M.S. and B.S., Civil Engineering	7 years in floodplains and flood risk, 3 years in river forecasting, 11 years in compliance monitoring	Floodplains and flood risk
Robert C. Wilson, GISP, CPESC		Biological resources, environmental coordination for transmission line work

Name/Education	Experience	Project role
HDR		
Thomas Blackwell, PWS M.S., Environmental Resource Management; B.A., Natural Science (Geography)	13 years in stream and wetland delineations and restoration design, permitting, NEPA documentation, and project management	Overall project management, field studies coordination, document preparation
Benjamin Burdette, EIT B.A., International/Global Studies M.S., Environmental/Environmental Health Engineering	Over 2 years in NEPA coordination and document preparation, and GIS mapping	Document preparation, GIS mapping
Mark P. Filardi, P.G. M.S. and B.S., Geology	19 years in hydrogeology and contaminated site assessment and remediation	Document preparation
Josh Fletcher, RPA M.A., Anthropology (Archaeology); B.S., Architectural Design	22 years in cultural resources management, regulatory compliance, NEPA documentation, and project management	Document preparation
Jake Irvin M.S. and B.S., Environmental Science	3 years in environmental conservation	Biological and water resource studies
Joshua Mace, CEPSCI M.S., Environmental Science, Natural Resources B.S., Environmental Science	17 years in wetland delineations, permitting, T&E habitat assessments, NEPA documentation, and project management	Biological and water resource studies QA/QC, document preparation
Jordan Myers M.E.M., Resource Ecology B.S., Biology	20 years in natural resource management, regulatory compliance, permitting, NEPA documentation and project management	Document preparation and coordination lead
Charles Nicholson B.S., Wildlife and Fisheries Science; M.S., Wildlife Management; PhD, Ecology and Evolutionary Biology	17 years in wildlife and endangered species research and management, 24 years in NEPA compliance	Document QA/QC

Name/Education	Experience	Project role
Harriet L. Richardson Seacat M.A., Anthropology (Cultural); B.A., Anthropology (Native American Studies minor)	19 years in anthropology, archaeology, history, NHPA and NEPA documentation, and project management	Document preparation, GIS mapping
Miles Spenrath B.S., Environment and Natural Resources	8 years in NEPA compliance	NEPA Lead, GIS mapping, document preparation
Kelly Thames. PWS B.A., Environmental Science M.S., Plant Biology	7 years in ecology, biology, stream and wetland delineations, permitting, habitat evaluation and restoration, and GIS mapping	Biological and water resource studies QA/QC, document preparation
Blair Goodman Wade, ENV SP M.E.M., Environmental Management; B.S., Integrated Sciences and Technology (Environmental Science and GIS)	14 years in regulatory compliance, NEPA documentation, and mitigation planning	Overall project management; Document QA/QC
Erica Wadl M.S., Forestry; B.S. Biology	13 years in environmental permitting, land management, and NEPA compliance	Document preparation
Rebecca Wilk, PWS B.S. and M.S., Biology	8 years in wetland delineations, CWA permitting, habitat evaluations, fisheries biology, and GIS mapping	WOUS delineation, GIS mapping, document preparation

CHAPTER 6

6 REFERENCES

Agenbroad, Larry D. 1988. Clovis People: The Human Factor in the Extinction Equation. In *Americans Before Columbus: Ice-Age Origins*, edited by Ronald C. Carlisle, pp. 63–74. Ethnology Monographs No. 12. Department of Anthropology, University of Pittsburgh, Pittsburgh, Pennsylvania.

Alabama Department of Conservation and Natural Resources (ADCNR). 2018. Alabama Regulations for Game, Fish, Furbearers, and Other Wildlife 2018-2019. Available at https://www.outdooralabama.com/sites/default/files/Enforcement/2018-2019%20REG%20BOOK%20Revised%20Final.pdf.

Alabama Department of Conservation and Natural Resources (ADCNR). 2019a. Outdoor Alabama. Wildlife Management Areas. Available at https://www.outdooralabama.com/hunting/wildlife-management-areas.

_____. 2019b. Indiana Bat, *Myotis sodalis*. Outdoor Alabama. Available at https://www.outdooralabama.com/bats/indiana-myotis.

_____. 2019c. Green Salamander, *Aneides aeneus*. Outdoor Alabama. Available at https://www.outdooralabama.com/salamanders/green-salamander.

_____. 2019d. Ocoee Salamander, *Desmognathus ocoee*. Outdoor Alabama. Available at https://www.outdooralabama.com/salamanders/ocoee-salamander.

_____. 2019e. Southern Cavefish, *Typhlichthys subterraneus*. Outdoor Alabama. Available at https://www.outdooralabama.com/cavefish/southern-cavefish.

_____. 2019f. Prairie Warbler, *Dendroica discolor*. Outdoor Alabama. Available at https://www.outdooralabama.com/wood-warblers/prairie-warbler.

Alabama Department of Public Health (ADPH). 2018. Soils and Onsite Sewage Forms. Available at https://www.alabamapublichealth.gov/onsite/forms.html.

Alabama Department of Transportation (ALDOT). 2017. Alabama Traffic Data. Available at https://aldotgis.dot.state.al.us/atd/default.aspx#

Alabama Herbarium Consortium (AHC) and The University of West Alabama (UWA). Alabama Plant Atlas (APA). 2019. Jackson County. Available at http://floraofalabama.org/Results.aspx?countyname=Jackson&countycode=JACK&FIPS=01071.

Alabama Soil and Water Conservation Committee (SWCC). 2018. *Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas*. Available at https://alconservationdistricts.gov/wp-content/uploads/2018/09/2018-Handbook-Vol-1.pdf.

Alabama State Data Center. 2019. Alabama County Population 2000-2010 and Projections 2020-2040. Available at https://alabama.app.box.com/s/go46dtnv2ktiyo5lwx7l8qko767rls7n.

Alexander, Lawrence. 1979. *Phase I Cultural Reconnaissance of Selected Areas of Redstone Arsenal, Madison County, Alabama*. Report of Investigations 8. Office of Archaeological Research, Alabama State Museum of Natural History, The University of Alabama.

Anderson, David G., Lisa D. O'Steen, and Kenneth E. Sassaman. 1996. Environmental and Chronological Considerations. In *The Paleoindian and Early Archaic Southeast*, edited by David G Anderson and Kenneth E. Sassaman, pp. 3–15. University of Alabama Press, Tuscaloosa, Alabama.

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Avian Power Line Interaction Committee, Edison Electric Institute, and the California Energy Commission. Washington, D.C. and Sacramento, CA. 2006.

_____. 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*. Avian Power Line Interaction Committee, Edison Electric Institute, and the California Energy Commission. Washington, D.C. October 2012.

Caldwell, Joseph R. 1958. Trend and Tradition in the Prehistory of the Eastern United States. *Memoirs of the American Anthropological Association* 88. Menasha, Wisconsin.

California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement*. Sacramento, CA: Division of Environmental Analysis. Available at https://dot.ca.gov/programs/environmental-analysis/noise-vibration.

Cambron, James W., and David C. Hulse. 1975. *Handbook of Alabama Archaeology: Part I: Point Types*. Edited by David L. DeJarnette. Archaeological Research Association of Alabama, Inc., Tuscaloosa, Alabama.

Chambless, Ann (editor). 2001. Jackson County Chronicles. *Jackson County Chronicles* 13(4).

_____. 2002. Jackson County Chronicles. *Jackson County Chronicles* 14(1).

_____. 2005. Jackson County Chronicles. *Jackson County Chronicles* 17(2).

Conant, R., and J. T. Collins. *A Field Guide to Reptiles and Amphibians: Eastern and Central North America*. 3rd ed. Boston: Houghton Mifflin, 1998.

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

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. Washington, D.C.: U.S. Fish and Wildlife Publication FWS/OBS-79/31.

eFloras. 2019. Flora of North America. Available at http://www.eFloras.org.

Federal Emergency Management Agency (FEMA). 2018. FEMA Flood Map Service Center: Search by Address. Available at https://msc.fema.gov/portal.

Geological Survey of Alabama. 2009. Geologic Map of the Hollywood 7.5-Minute Quadrangle, Jackson County, Alabama. Available at https://www.gsa.state.al.us/img/Geological/Quads/QS52/QS52_Plate.pdf.

_____. 2011. Alabama Sinkholes. Available at https://www.arcgis.com/home/item.html?id=60f19f56de714eeb8b3ca5e1b96d49ee.

Gist, W. Jerry. 1968. *The Story of Scottsboro, Alabama*. Rich Printing Company, Inc., Nashville, Tennessee.

Hagood, Thomas Chase. 2017. Territorial Period and Early Statehood. *Encyclopedia of Alabama*.

HDR, Inc. (HDR). 2019a. *Wildlife and Vegetation Assessment, Bellefonte Solar: Jackson County, Alabama.* May 29, 2019.

_____. 2019b. *Phase I Environmental Site Assessment, Bellefonte Solar: Jackson County, Alabama.* April 26, 2019.

Holmes, William H. 1903. Aboriginal Pottery of the Eastern United States. In *Twentieth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution*, edited by J.W. Powell, pp. 1–200. Government Printing Office, Washingthon, D.C.

Huheey, J. E. and R. A. Brandon. 1973. Rock-Face Populations of the Mountain Salamander, *Desmognathus ochrophaeus*, In North Carolina. *Ecological Monographs* 43:59-77.

Iowa Environmental Mesonet (IEM). 2019. Iowa State University, Climate Data web page. Available at http://mesonet.agron.iastate.edu/climodat/.

Jackson County Economic Development Authority (JCEDA). 2019. Infrastructure and Logistics. Available at https://www.jacksoncountyeda.org/infrastructure.

Kays, R, and D E. Wilson. 2002. *Mammals of North America*. Princeton University Press, Princeton, NJ.

Lady Bird Johnson Wildflower Center. 2019. Plant Database. Available at https://www.wildflower.org/plants/.

LandScope America. 2019. Cumberlands and Southern Ridge and Valley Ecoregion. Available at http://www.landscope.org/explore/natural_geographies/ecoregions/Cumberlands%20and%20Southern%20Ridge%20and%20Valley/.

Lee, J. Lawrence. 2014. Alabama Railroads. *Encyclopedia of Alabama*.

McLoughlin, William G. 1981. Experiment in Cherokee Citizenship, 1817-1829. *American Quarterly* 33(1):3–25.

McNutt, Charles H., Tasha Benyshek, Raymond Ezell, and Shannon Tushingham. 1998. *Phase I Archaeological Investigation of Ground Disturbance Areas 12 and 13, Redstone Arsenal, Madison County, Alabama*. TRC Garrow Associates, Inc., Memphis, Tennessee, September.

Multi-Resolution Land Characteristics and USGS (MRLC and USGS). 2019. National Land Cover Database Evaluation, Visualization, and Analysis tool. Available at https://www.mrlc.gov/viewer/.

Nance, C. Roger, and Beverly E. Bastian. 1974. *Report on Old Bellefonte: An Historical Site in Northern Alabama*. University of Alabama at Birmingham.

North American Bird Conservation Initiative (NABCI). 2019. Bird Conservation Regions Map. Available at http://nabci-us.org/resources/bird-conservation-regions-map/.

National Park Service (NPS). 2017. Physiographic Provinces. Available at https://www.nps.gov/subjects/geology/physiographic-provinces.htm.

_____. 2019. Appalachian Plateaus Province. Available at https://www.nps.gov/articles/appalachiannplateausprovince.htm.

National Oceanic and Atmospheric Administration (NOAA). 2019. Data Tools: 1981-2010 Normals. Available at https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

NatureServe. 2019. NatureServe Explorer. Available at http://explorer.natureserve.org.

Noltie, D. P. and C. M. Wicks. 2001. How Hydrology Has Shaped the Ecology of Missouri's Ozark Cavefish, *Amblyopsis rosae*, and Southern Cavefish, *Typhlichthys subterraneus*: Insights on the Sightless from Understanding the Underground. *Environmental Biology of Fishes* 62:171-194.

Paleontology Portal. 2019. Paleontology and geology of Alabama. Available at http://paleoportal.org/index.php?globalnav=time_space&sectionnav=state&name=Alabama.

Parker, Patricia L., and Thomas F. King. 1998. *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Register Bulletin 38. National Park Service, Department of the Interior.

Phillips, Phillip. 1970. *Archaeological Survey in the Lower Yazoo Basin, Mississippi, 1949-1955*. 1st–2nd ed. Vol. 60. Harvard University, Cambridge, Massachusetts.

Power Magazine. 2019. *Judge: TVA Deal for Bellefonte Nuclear Plant Stays in Place*. Available at https://www.powermag.com/judge-tva-deal-for-bellefonte-nuclear-plant-stays-in-place/?printmode=1.

Sears, W., and James B. Griffin. 1950. *Fiber-Tempered Pottery of the Southeast. In Prehistoric Pottery of the Eastern United States*, edited by James B. Griffin. Museum of Anthropology, University of Michigan, Ann Arbor, MI.

Service, Elman R. 1971. *Primitive Social Organization*. 2nd ed. Random House, New York, New York.

Smith, Harold E, and J. Shawn Chapman. 1993. *Three Archaeological Sites near Depoy: A Phase II National Register Evaluation of 15MU166, 15MU167, and 15MU168, Muhlenberg County, Kentucky*. Kentucky Heritage Council, Lexington, KY.

Tankersley, Kenneth B. 1994. Was Clovis a Colonizing Population in Eastern North America? In *The First Discovery of America, Archaeological Evidence of the Early Inhabitants of the Ohio Area*, edited by William S. Dancey, pp. 95–109. Ohio Archaeological Council, Columbus, Ohio.

The National Society of the Colonial Dames of America in the State of Alabama (editor). 1966. *Early Courthouses of Alabama Prior to 1860*. Second. Jordan Printing Company, Mobile, Alabama.

The Scottsboro Citizen. 1895. Octogenarian Gone - Death of Mr. Hamlin Caldwell in Scottsboro Tuesday. *The Scottsboro Citizen*, September 5.

Tennessee Valley Authority (TVA). 1981. Class Review of Repetitive Actions in the 100-Year Floodplain. *Federal Register* 46(76): 22845-22846.

_____. 1983. Procedures for Compliance with the National Environmental Policy Act. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/tvanepa_procedures.pdf.

_____. 1997. Final Environmental Impact Statement for the Bellefonte Conversion Project. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/Bellefonte%20Property%20Disposal/archive/Bellefonte%20Nuclear%20Plant%20Units%201%20and%202%20Environmental%20Report%201997.pdf.

_____. 2014. TVA Solar Photovoltaic Projects Final Programmatic Environmental Assessment. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/TVA%20Solar%20Photovoltaic%20Projects/PV-final%20PEA-Solar%20PV-reduced%20size.pdf.

_____. 2016. Bull Run Fossil Plant Landfill Final Environmental Impact Statement, Anderson County, Tennessee. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/Disposal%20of%20Coal%20Combustion%20Residuals%20from%20the%20Bull%20Run%20Fossil%20Plant/2016_11_21_BRF%20Landfill%20Final_EIS.pdf.

_____. 2017a. *Site Clearing and Grading Specifications*. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Energy/Transmission/Transmission-Projects/pdf/TVA%20Site%20Clearing%20and%20Grading%20Specifications_July2017.pdf.

_____. 2017b. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities, Revision 3. Edited by G. Behel, S. Benefield, R. Brannon, C. Buttram, G. Dalton, C. Ellis, C. Henley, T. Korth, T. Giles, A. Masters, J. Melton, R. Smith, J. Turk, T. White, and R. Wilson. Chattanooga, TN. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Energy/Transmission/Transmission-Projects/pdf/BMP%20Manual%20Revision%203.0_FINAL_8-4-17.pdf.

_____. 2018. *Transmission System Vegetation Management Final Programmatic Environmental Impact Statement*. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Environmental%20Reviews/Transmission%20System%20Vegetation%20Management%20Program/final_tva_transmission_system_vegetation_management_peis_no_appendices.pdf.

_____. 2019a. Final 2019 Integrated Resource Plan and Final Supplemental Environmental Impact Statement. Available at https://www.tva.gov/Environment/Environmental-Stewardship/Integrated-Resource-Plan.

_____. 2019b. Current TVA Transmission System Projects. Available at https://www.tva.gov/Energy/Transmission-System/Transmission-System-Projects.

_____. 2019c. TVA Heritage Database Results (Provided on March 27, 2019 and August 16, 2019).

_____. 2019d. TVA Local Power Companies. Available at https://www.tva.gov/file_source/TVA/Site%20Content/Energy/Our-Customers/TVA_Distributors_Web_02-17-v2.pdf.

U. S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Available at https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4530.

_____. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0), ed. J.F. Berkowitz, J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center. Available at https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7607.

U.S. Bureau of Land Management. U.S. Department of the Interior Bureau of Land Management General Land Office Records Database.

U.S. Census Bureau (USCB). 2013. U.S. Federal Census, 1830-1940. Online database. Ancestry.com Operations, Inc., Provo, Utah.

_____. 2018. Income and Poverty in the United States: 2017. Report Number P60-263. Available at https://www.census.gov/content/dam/Census/library/publications/2018/demo/p60-263.pdf.

_____. 2019. American Factfinder. Town of Hollywood, Alabama. Available at https://factfinder.census.gov/bkmk/cf/1.0/en/place/Hollywood town, Alabama/POPULATION/DECENNIAL_CNT.

U.S. Department of Agriculture (USDA). 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook Number 701. US Forest Service, US Department of Agriculture. Available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5412126.pdf.

_____. 2019a. Web Soil Survey. Natural Resource Conservation Service, USDA. Available at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

_____. 2019b. Hydric Soils – Introduction. Available at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053961.

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

_____. 2015. “Construction Noise Handbook.” US Department of Transportation, Federal Highway Administration. Available at https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.

U.S. Environmental Protection Agency (USEPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With An Adequate Margin of Safety.* March 1974. Prepared By the U.S. Environmental Protection Agency Office of Noise Abatement and Control.

_____. 2006. *Spill Prevention, Control, and Countermeasures (SPCC) Rule Amendment. Option for Qualified Oil-Filled Operational Equipment. EPA-550-F-06-008.* December 2006. http://www.epa.gov/emergencies

_____. 2011. *Spill Prevention, Control, and Countermeasures (SPCC) Rule. Streamlined Requirements for Tier I and II Qualified Facilities.* May 2011. Available at http://www.epa.gov/emergencies.

_____. 2019a. Alabama Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Available at https://www3.epa.gov/airquality/greenbook/anayo_al.html.

_____. 2019b. The 2014 National Emissions Inventory Data. Available at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data.

_____. 2019c. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2017 (full report). Available at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017.

_____. 2019d. EJSCREEN: EPA's Environmental Justice Screening and Mapping Tool (Version 2018). Available at https://ejscreen.epa.gov/mapper/.

U.S. Fish and Wildlife Service (USFWS). 1985. Recovery Plan for the Pink Mucket Pearly Mussel; *Lampsilis orbiculata* (Hildreth, 1828). U.S. Fish and Wildlife Service, Region 4, Atlanta, Georgia. 47 pp.

_____. 1997a. Gray Bat (*Myotis grisescens*) Fact Sheet. USFWS Ecological Services Field Offices-Midwest Region. September 19, 1997. Available at https://www.fws.gov/midwest/endangered/mammals/pdf/gray-bat.pdf.

_____.1997b. Pink Mucket (*Lampsilis orbiculata*) Fact Sheet. USFWS Ecological Services Field Offices-Midwest Region. November 1997. Available at https://www.fws.gov/midwest/endangered/clams/pdf/pink-mucket.pdf.

_____. 2006. Indiana Bat (*Myotis sodalis*) Fact Sheet. USFWS Ecological Services Field Offices-Midwest Region. Available at https://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbafctsht.pdf.

_____. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available at https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf.

_____. 2014. Prairie Warbler (*Dendroica discolor*). Currituck National Wildlife Refuge, NC. November 2014. Available at https://www.fws.gov/refuge/currituck/wildlife_and_habitat/prairie_warbler.html.

_____. 2015a. Ecoregions of Alabama and Georgia. Available at https://www.fwspubs.org/doi/suppl/10.3996/072015-JFWM-062/suppl_file/72015-jfwm-062.s5.pdf.

_____. 2015b. Threatened Species Status for the Northern Long-eared Bat with 4(d) Rule. April 2015. Available at https://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07069.pdf.

_____. 2019. IPaC – Information, Planning, and Conservation System. Trust Resources List for Bellefonte Solar Energy Center. Available at http://ecos.fws.gov/ipac/.

U.S. Geological Survey (USGS). 1995. Ground Water Atlas of the United States. Available at: http://pubs.usgs.gov/ha/730g/report.pdf

_____. 2014. Seismic Risk Map. Available at: https://earthquake.usgs.gov/static/lfs/nshm/conterminous/2014/2014pga2pct.pdf.

_____. 2018. Physiographic Divisions of the Conterminous U.S. Available at https://water.usgs.gov/GIS/metadata/usgswrd/XML/physio.xml.

_____. 2019a. Sinkholes. Available at https://www.usgs.gov/special-topic/water-science-school/science/sinkholes?qt-science_center_objects=0#qt-science_center_objects.

_____. 2019b. *National Hydrography Dataset*. Available at http://nhd.usgs.gov/.

_____. 2019c. TopoView. Available at https://ngmdb.usgs.gov/topoview/viewer/#4/39.94/-99.89.

U.S. Global Change Research Program (USGCRP). 2018. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Available at https://nca2018.globalchange.gov/.

U.S. Water Resources Council. 1978. Guidelines for Implementing EO 11988, Floodplain Management. *Federal Register* 43:6030.

Walthall, John A. 1980. *Prehistoric Indians of the Southeast: Archaeology of Alabama and the Middle South*. University of Alabama Press, Tuscaloosa, Alabama.

Walthall, John A., and Ned. J. Jenkins. 1976. The Gulf Formational Stage in Southeastern Prehistory. *Southeastern Archaeological Conference Bulletin* 19:43–49.

Wilken, Ed, Francisco Jiménez Nava, and Glenn Griffith. 2011. North American Terrestrial Ecoregions—Level III. Commission for Environmental Cooperation, Montreal, Canada.

Appendices

Provided in a separate file due to size