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**LOGAN COUNTY SOLAR
DRAFT ENVIRONMENTAL ASSESSMENT**
Logan County, Kentucky

Prepared for:
Tennessee Valley Authority
Knoxville, Tennessee

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Appendix E – Public Notice

Symbols, Acronyms, Abbreviations, and Glossary of Terms

AADT	Average annual daily traffic
AC	Alternating current
ACS	American Community Survey
BESS	Battery energy storage system
BG	Block group
BMP	Best management practice
BUILD	Better Utilizing Investments to Leverage Development
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO ₂	Carbon dioxide
CT	Census tract
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibel
DC	Direct current
EA	Environmental assessment
EIS	Environmental impact statement
EMF	Electromagnetic field
EO	Executive Order
ESA	Endangered Species Act
°F	Fahrenheit
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
FY	Fiscal year
GHG	Greenhouse gas
HUC	Hydrologic unit code
IPaC	Information for Planning and Consultation
IRP	Integrated Resource Plan
KDEP	Kentucky Department of Environmental Protection
KEEC	Kentucky Energy and Environment Cabinet
KNP	Office of Kentucky Nature Preserves
KPDES	Kentucky Pollutant Discharge Elimination System
kV	Kilovolt
KYBAT	Kentucky Biological Assessment Tool
KYTC	Kentucky Transportation Cabinet
L _{dn}	Day-night average sound
LEAD	Logan Economic Alliance for Development
MBTA	Migratory Bird Treaty Act
MP	Milepost
MPT	Main power transformer

MVT	Mid-voltage transformer
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO _x	Nitrogen oxides
NWP	Nationwide Permit
O ₃	Ozone
OHGW	Overhead ground wire
OPGW	Fiber-optic overhead ground wire
OSHA	Occupational Safety and Health Act
Pb	Lead
PGA	Peak ground acceleration
Phase I ESA	Phase I Environmental Site Assessment
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
PRECC	Pennyrile Rural Electric Cooperative Corporation
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably foreseeable future action
RFP	Request for proposal
RNHD	Regional Natural Heritage Database
ROW	Right-of-way
SO ₂	Sulfur dioxide
SPCC	Spill Prevention, Countermeasure, and Control
SRC	Silicon Ranch Corporation
SWPPP	Stormwater Pollution Prevention Plan
TL	Transmission line
TVA	Tennessee Valley Authority
U.S.	United States
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOUS	Waters of the U.S.

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

Tennessee Valley Authority (TVA) entered into a power purchase agreement (PPA) with Russellville Solar LLC (Russellville Solar), a wholly owned subsidiary of Silicon Ranch Corporation (SRC), on January 8, 2021, to purchase the electric power generated by a proposed solar photovoltaic (PV) facility in Logan County, Kentucky. The solar facility, known as Logan County Solar, would be owned by SRC and operated by Russellville Solar. The facility would have an installed capacity of 173 megawatts (MWs) alternating current (AC) and a battery energy storage system (BESS) of 30 MW. The solar facility would connect to TVA’s adjacent existing Springfield-Logan Aluminum 161-kilovolt (kV) transmission line (TL). To interconnect to TVA’s existing electrical grid, Russellville Solar would build the Russellville Solar 161-kV substation (also called the Project substation) and TVA would build the Cave Springs 161-kV switching station (also called the Project switching station) in the northeastern portion of the solar facility site. Under the terms of the PPA, TVA would purchase the electric output from the solar facility for a term of 20 years, subject to satisfactory completion of all applicable environmental reviews. Together, the associated construction and operation of Logan County Solar and the TVA interconnection facilities are herein referred to alternately as the “Project” and the “Proposed Action.”

The proposed solar PV facility would occupy approximately 1,086 acres of a 1,569-acre Project site located approximately two miles southwest of the city of Russellville. The solar facility would consist of arrays of either crystalline silicon or thin-film PV panels attached to ground-mounted single-axis trackers, central inverters, transformers, a substation and BESS, a switching station, an operations and maintenance building, access roads, and all associated cabling and safety equipment.

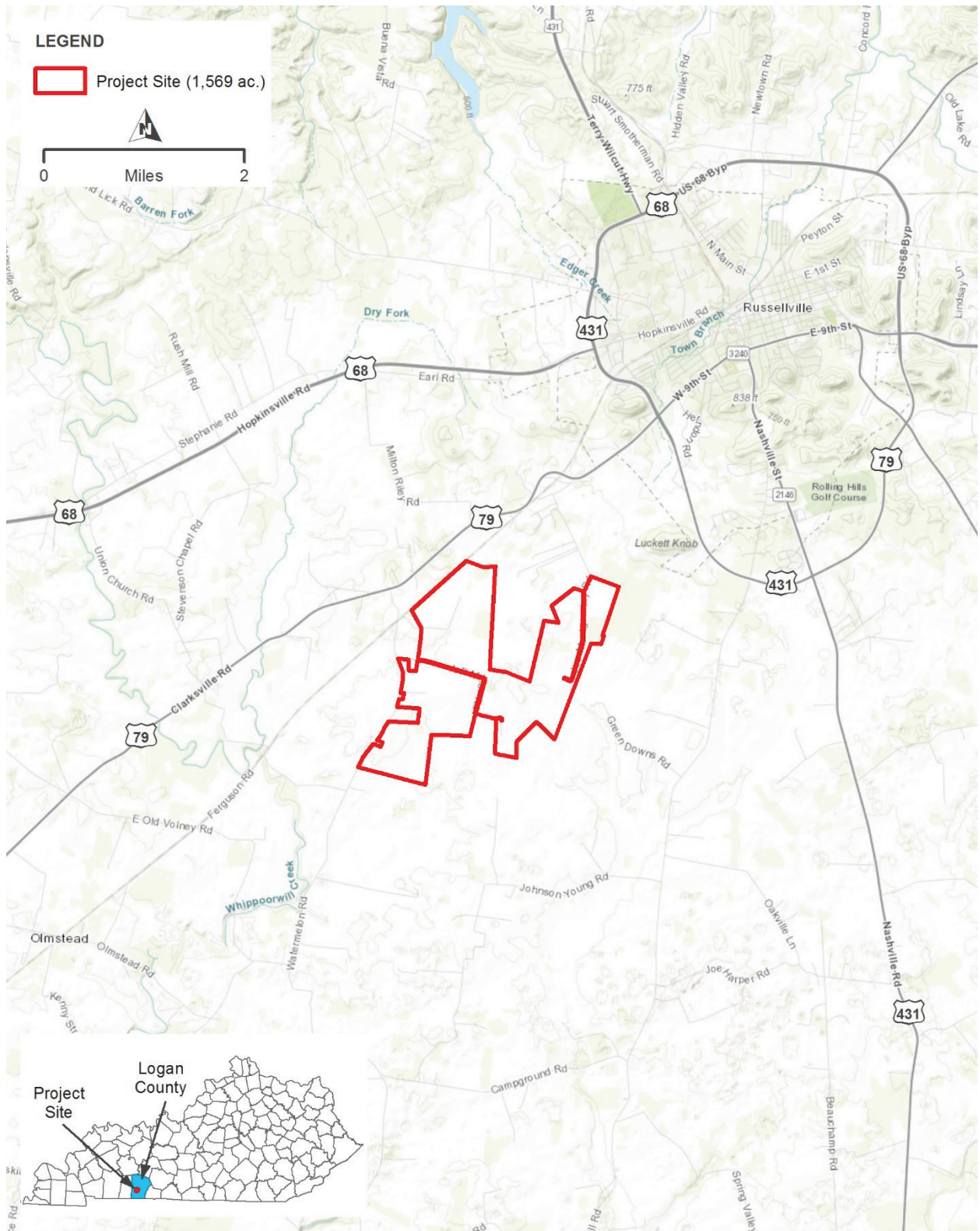


Figure 1-1. Logan County Solar Project site in Logan County, Kentucky

1.1 Purpose and Need for Action

TVA is a corporate agency of the United States that provides electricity for business customers and local power companies serving nearly 10 million people in parts of seven southeastern states called the Tennessee Valley. Since 1933, TVA’s mission has been to serve the people of the Tennessee Valley region to make life better.

TVA produces or obtains electricity from a diverse portfolio of energy sources, including solar, hydroelectric, wind, biomass, fossil fuel, and nuclear. The 2019 Integrated Resource Plan (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. The 2019 IRP anticipates growth of solar in all scenarios analyzed, with most scenarios anticipating 5,000-8,000 MW AC and one anticipating up to 14,000 MW AC (TVA 2019).

Customer demand for cleaner energy prompted TVA to release a request for proposal (RFP) for renewable energy resources, the 2020 Renewable RFP. In response to this RFP, TVA received multiple proposals from solar developers, including Russellville Solar. The resulting PPAs, including the Russellville Solar PPA, will help TVA meet immediate needs for additional renewable generating capacity in response to customer demand, and help fulfill the renewable energy goals established in the 2019 IRP (TVA 2019). The Proposed Action would provide cost-effective renewable energy consistent with the IRP and TVA goals.

1.2 Scope of this Environmental Assessment

Pursuant to the National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] §§ 4321 et seq.) 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 NEPA regulations (18 CFR 1318) and procedures to assess the potential impacts of the Proposed Action (TVA 2020a). This EA will serve as the basis of TVA’s determination of whether the Proposed Action is “environmentally acceptable,” as stated in the PPA, meaning that TVA concludes that “the location, operation, and maintenance of the Project would not result in unacceptable impacts inconsistent with the purposes, provisions, and requirements of applicable federal, state, and local environmental laws and regulations.”

TVA’s Proposed Action would result in the construction and operation of the Logan County Solar facility by Russellville Solar, as well as the construction and operation by TVA of a new switching station and connection to the TVA transmission system. The scope of this EA covers the impacts of the construction and operation of the solar facility and associated transmission system components. TVA previously applied a categorical exclusion to conduct geotechnical borings at the TVA Cave Springs 161-kV switching station to inform its placement and design.

This EA (1) describes the existing environment in the Project area that would be affected by the Proposed Action and (2) analyzes the potential effects of the No Action Alternative and the Proposed Action Alternative on the environment. 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. Based on internal scoping and identification of applicable laws, regulations, executive orders (EOs), and policies, TVA identified the following resource areas for analysis in this EA: land use; geology, soils, and prime farmland; water resources; biological resources; visual resources; noise; air quality and greenhouse gas (GHG) emissions; cultural resources; utilities; waste management; public and occupational health and safety; transportation; socioeconomics; and environmental justice.

This EA consists of five chapters discussing the purpose and need for the Proposed Action, public and agency involvement, necessary permits and approvals, the alternatives considered, mitigation measures to be employed by the Project, reasonably foreseeable environmental trends and planned actions in the area, resources potentially affected, and analyses of impacts on affected resources. Additionally, the document presents the list of EA preparers and references cited and includes appendices that contain supporting information.

1.3 Public and Agency Involvement

Russellville Solar hosted two public meetings to describe the Project at the Logan County Cooperative Extension Office in Russellville. The first of these meetings was held between 6:00 PM and 8:00 PM on July 29, 2021, and the second meeting was held between 5:45 PM and 8:00 PM on December 14, 2021. The July meeting was advertised on July 13, 2021, in the *News Democrat-Leader*, a local newspaper published in Russellville, and letters were mailed to adjacent landowners to notify them of the upcoming meeting. The December meeting was a dinner meeting advertised via invitations to surrounding landowners, which included a larger distribution area than the July meeting mailings. Shared Project details during both meetings included the Project site acreage and anticipated disturbance footprint, key components of the Project, the electrical output, an explanation of the ongoing NEPA process, and the potential economic benefits to the local community. Maps showing the Project site location and the preliminary design, as well as computer renderings of the Project were on display for the public to view. The December meeting presented computer renderings of the Project from major residential receptor areas surrounding the Project site.

TVA has issued this EA for a 30-day public and agency review and comment period. TVA notified the public of the availability of the draft EA via an advertisement in the *News Democrat-Leader* (Appendix E). TVA also notified appropriate local, state, and federal agencies and federally recognized tribes of the availability of the draft EA. TVA will review any comments received on the draft EA and address substantive comments, as appropriate, in the final EA. TVA is also consulting on the effects of the Project with appropriate regulatory agencies and tribes.

1.4 Permits and Approvals

Construction of Logan County Solar would require federal and state permits and/or coordination, as well as certification for the proper installation of some Project components (Table 1-1). Adherence to permit or certification conditions helps to avoid or minimize environmental impacts, as discussed in relation to specific resource areas in Chapter 3.

Table 1-1. Permits and Approvals List

Permit/Approval/Coordination	Justification	Lead Agency
Clean Water Act (CWA) Section 404 Nationwide Permit (NWP) or Individual Permit	NWPs would be required for impacts to jurisdictional waters that are less than 0.5 acre. An Individual permit would be required if the impacts were to exceed 0.5 acre.	United States Army Corps of Engineers (USACE)
CWA Section 401 Water Quality Certification	Required for work under federal license or permit that would result in a discharge to waters of the U.S. (WOUS).	Kentucky Department of Environmental Protection (KDEP) Division of Water
Kentucky Pollutant Discharge Elimination System (KPDES) Stormwater Construction General Permit	Required for discharges into WOUS. Must include a Notice of Intent (NOI), erosion and sediment control plans, and a stormwater pollution prevention plan (SWPPP).	KDEP Division of Water
Septic System Permit	Required if a septic system will be installed. The permit would involve on-site evaluations to determine if site and soil conditions are suitable for on-site wastewater systems.	Kentucky Cabinet for Health and Family Services
National Historic Preservation Act (NHPA) Section 106 Consultation	In compliance with Section 106 of NHPA, TVA is consulting with the Kentucky Heritage Council (KHC), acting as the Kentucky State Historic Preservation Officer (SHPO), and federally recognized tribes with interests in the Project area in relation to Project effects on historic properties (i.e., eligible for the National Register of Historic Places [NRHP]) and other cultural resources (Appendix D).	KHC and federally recognized tribes
State Siting Board Approval	Project must submit a detailed application to the Kentucky State Board on Electric Generation and Transmission Siting to show that the Project is adhering to local ordinances and describe the anticipated Project effects to aspects of the human environment and how the Project will mitigate those.	Kentucky State Board on Electric Generation and Transmission Siting
Open Burning Permit	May be required for the open burning of any vegetation cleared from the site.	KDEP
Endangered Species Act (ESA) Section 7 Consultation	In compliance with Section 7 of ESA, TVA is consulting with the USFWS in relation to Project effects on federally listed species (Appendix C).	USFWS

CHAPTER 2 – DESCRIPTION OF THE ALTERNATIVES

This chapter describes the two alternatives evaluated in this EA, the No Action Alternative and the Proposed Action Alternative, and explains the rationale for identifying the alternatives to be evaluated, provides a comparison of the potential environmental impacts of the evaluated alternatives, and identifies the Preferred 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 (i.e., TVA would not be involved with the Project), and the proposed solar PV facility in Logan County would not be constructed. Existing conditions (e.g., land use, natural resources, visual resources, physical resources, and socioeconomics) in the Project area would not change as a result of the Proposed Action; however, the Project site could be affected by other future developments. TVA would continue to rely on other sources of generation as described in the 2019 IRP (TVA 2019) to ensure an adequate energy supply and to meet its goals for increased renewable energy and low GHG-emitting generation.

2.2 Proposed Action

Under the Proposed Action Alternative, Russellville Solar would construct and operate a 173-MW AC single-axis tracking PV solar power facility and 30-MW AC BESS on a 1,569-acre site located approximately two miles southwest of the city of Russellville in Logan County. TVA would connect the facility to TVA's adjacent existing Springfield-Logan Aluminum 161-kV TL via a proposed substation and switching station in the northeastern portion of the solar facility site and purchase the facility's energy output under a 20-year PPA with Russellville Solar. The solar facility would consist of multiple solar arrays using either crystalline silicon or thin-film PV panels attached to ground-mounted single-axis tracking metal supports, central inverters, several medium voltage transformers (MVTs) and one or two main power transformers (MPTs), a substation and BESS, a switching station, an operations and maintenance building, internal site 16-foot-wide access roads, and all associated cabling and safety equipment. Concrete foundations may be required for inverters, transformers, the switching station, the substation, and/or the BESS. The placement of the facility components would avoid and minimize impacts to environmental resources, including cultural resources, to the maximum extent possible. The proposed Project and associated interconnection components would occupy approximately 1,086 acres of the approximately 1,569-acre Project site (Figures 2-1 and 2-2). The Project site is comprised of nine tracts of land leased by Russellville Solar from four landowners.

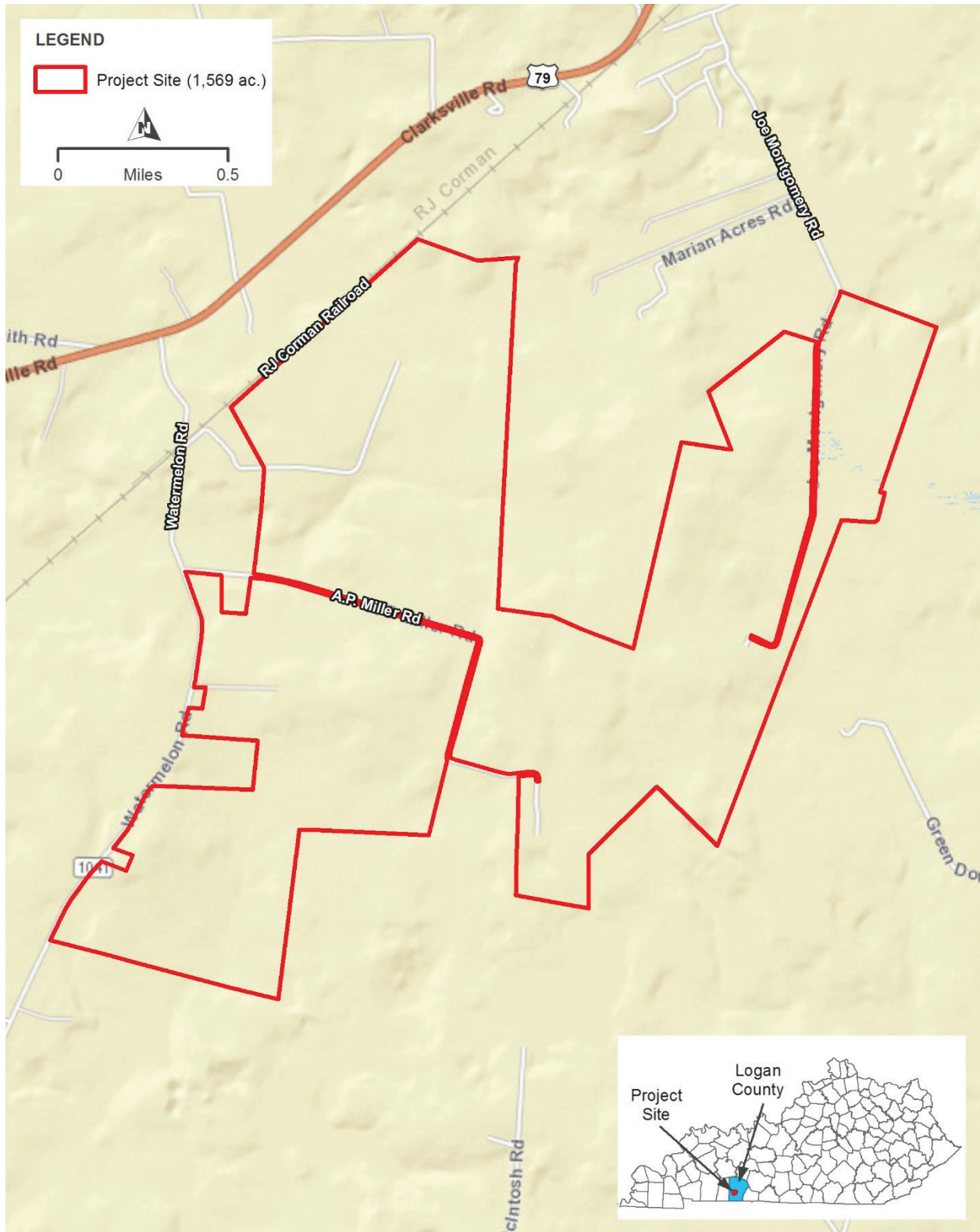


Figure 2-1. The 1,569-acre Project site

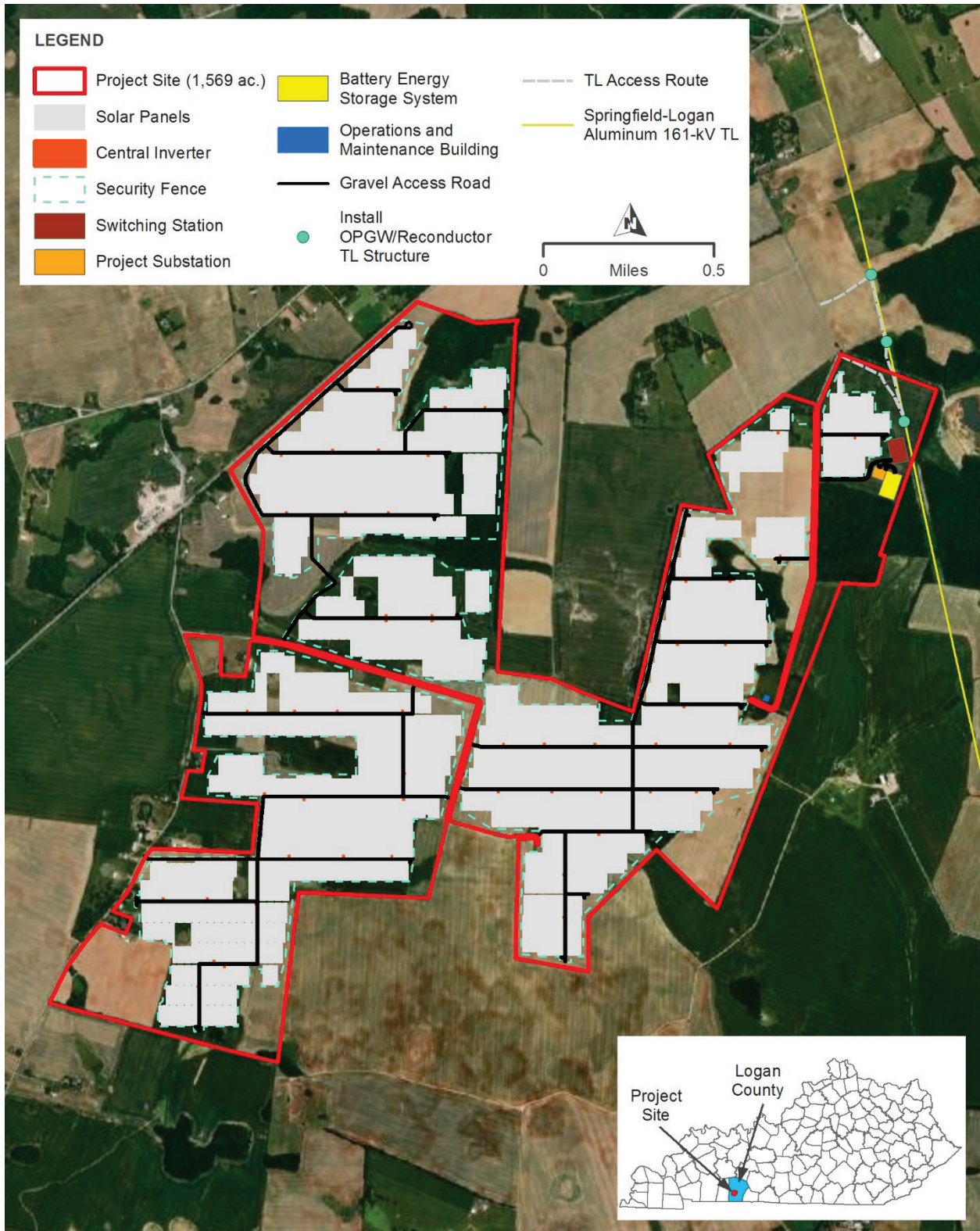


Figure 2-2. Aerial photo showing the proposed layout of the Logan County Solar facility components

The Project site is in a rural agricultural area and is bounded on the west by Watermelon Road and the RJ Corman Railroad, which roughly parallels U.S. 79 approximately a quarter mile south of the highway. A.P. Miller Road traverses western and central portions of the Project site, and Joe Montgomery Road traverses eastern portions of the Project site. The Project site is predominantly flat to gently sloping agricultural land with scattered forested areas and wetlands, streams, ponds, and karst features. Several residences and agricultural buildings are scattered across the Project site. The PV panel and inverter blocks in close vicinity and not separated by public roads would be enclosed together by chain-link security fencing.

2.2.1 Project Description

Logan County Solar would convert sunlight into direct current (DC) electrical energy within PV panels (modules) (Figure 2-3). PV power generation is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current is produced, which can be used as electricity (TVA 2014).

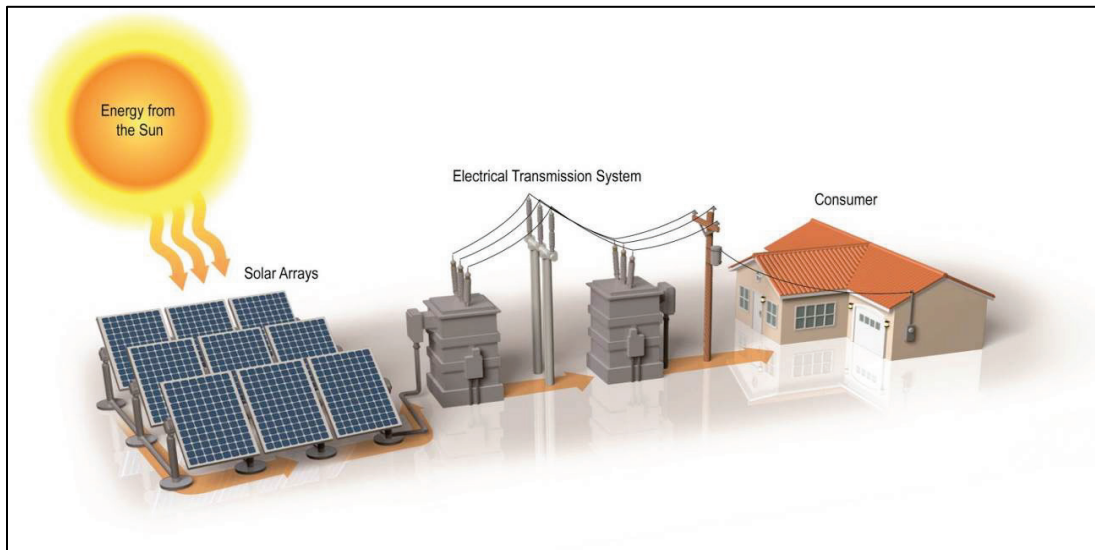


Figure 2-3. General energy flow diagram of PV solar system (not to scale)

The Project would be composed of anti-reflective PV modules mounted together and connected electrically in series to form arrays or “strings” of modules, with the maximum string size chosen to ensure that the maximum inverter input voltage is not exceeded by the string voltage at the Project site’s high design temperature. The modules, estimated to be approximately 6.6 feet by 4 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 modules into AC electricity. The PV module and inverter blocks in close vicinity to and not separated by public roads would be enclosed together by chain-link security fencing. The perimeter of the facility would be landscaped to provide a visual buffer in accordance with Logan County requirements.

The modules would be attached to single-axis trackers that follow the path of the sun from the east to the west across the sky (Figure 2-4). The inverter specification 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 MVT, which would step-up the AC voltage to minimize the AC cabling electrical losses between the central inverters and the proposed on-site Project substation. Underground AC power cables would connect all of the MVTs to the MPT(s) located within the substation.

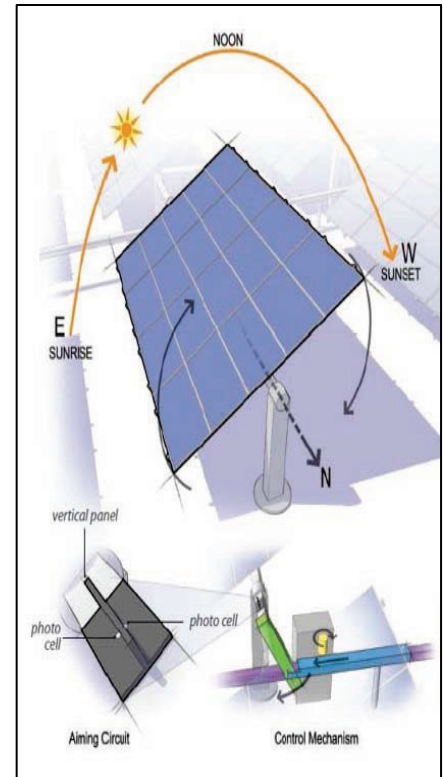


Figure 2-4. Diagram of single-axis tracking system (not to scale)

The solar facility would also include a BESS that would occupy an approximately 2.3-acre area adjacent to and connected to the Project substation. The multiple battery containers and inverter and transformer skids associated with the BESS would be installed on concrete pads, and gravel would cover the remainder of the BESS location. Other temporary or permanent Project components include construction laydown areas and security and communications equipment. Compacted gravel or dirt access roads would provide access to each inverter block and the proposed substation and switching station. An operations and maintenance building would be constructed along Joe Montgomery Road in the eastern portion of the Project site. Also, if determined necessary, the Project would include Project water wells and a septic system or pump-out septic holding tank. Figure 2-2 shows the Project site with and major Project components.

2.2.2 Solar Facility Construction

As part of KPDES permit authorization (see Section 1.4), the site-specific SWPPP would be finalized with the final grading and civil design and would address all construction-related activities prior to construction commencement. The solar facility site would be prepared by surveying, staking, and installing six-foot-tall chain-link security fencing topped with three strands of barbed wire around the Project site. Entrances to the solar facility would be protected by locked, double-swing gates. The Project site would be accessible only to TVA, Russellville Solar, and their agents and contractors.

Construction assembly areas (laydown areas) would be established for worker assembly, safety briefings, vehicle parking, and material storage during construction. The laydown areas would likely be graveled. Temporary construction trailers for material storage and office space would be parked on site. In accordance with TVA requirements (see Section 2.5.1), minimum 50-foot buffers surrounding wetlands and intermittent and perennial streams and minimum 100-foot buffers surrounding the five identified sinkhole fissures/karst features would be established as avoidance measures prior to any clearing, grubbing, grading, or utility line installation activities conducted by the construction contractor. Apart from removal of tall vegetation through nonmechanical means and leaving the roots in place, these buffered areas would be avoided during construction to the greatest extent practicable. The buffered areas would be marked and protected by silt fences and sediment traps in strategic drainage areas, and other erosion prevention and sediment control BMPs would be implemented, as detailed in the site-specific SWPPP.

Construction activities would be sequenced to minimize the time that bare soil in disturbed areas is exposed. Construction areas would be cleared of debris and tall vegetation, mowed, and lightly graded, as needed, for construction and placement of the solar modules, gravel access roads, substation, BESS, switching station, accompanying electrical components, and other Project components. Pennyrile Rural Electric Cooperative Corporation (PRECC) would relocate portions of their distribution lines in the western portion of the Project site to avoid PV module locations. The relocations would be within previously surveyed areas or previously disturbed public road ROW. While several on-site buildings will be demolished, one building that is a Kentucky Landmark would be avoided, and some other buildings are anticipated to remain to support the sheep grazing operation established as part of the Project, as described in Section 2.2.3. Clearing of trees and other tall vegetation would be accomplished with chain saws, skidders, bulldozers, tractors, and/or low-ground pressure feller-bunchers. Because the area to be cleared is primarily open agricultural land, minimal vegetative debris would accumulate during site preparation. Any that does accumulate on site would be disposed of by open burning. Only vegetation and untreated wood would be burned, and no burning of other construction debris is anticipated. Prior to burning, Russellville Solar would obtain any necessary permits, as presented in Section 1.4. Mowing would continue as needed to contain growth during construction.

Russellville 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 greatest extent possible. Grading activities would be performed with earthmoving equipment and would result in a consistent slope. 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 on site for redistribution over the disturbed area after the grading is completed. Off-site sediment migration would be minimized by the placement of silt fences around each area of ground disturbance within the Project site. 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. To manage stormwater during construction, on-site temporary sedimentation basins, sediment traps, or diversion berms would be constructed within the disturbed area of the Project site. Any necessary sedimentation basins and traps would be compliant with KEEC requirements and

would be constructed either by impoundment of natural depressions or by excavating the existing soil.

The floor and embankments of the sedimentation basins would be allowed to naturally revegetate after construction or replanted as necessary to provide natural stabilization and minimize subsequent erosion. Other disturbed areas would be seeded after construction using a mixture of certified weed-free, low-growing native and/or noninvasive grass and herb seeds containing species that would tend to attract pollinators and would be used as sheep fodder during operations. If conditions require, soil may be further stabilized by mulch or sprayable fiber mat. Hydroseeding may be employed as an alternative measure for areas with steep slopes. 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 is stable.

During construction, water would be used as needed for soil compaction and dust control and for sewer treatment, if determined necessary. Water in sufficient quantity and quality would be made available through the use of on-site groundwater wells or by delivery via water trucks. If selected, wells would be located to provide access for construction water and to reduce the potential for any significant water level drawdown. If water quality is unsuitable for potable use without disinfection at a minimum, a potable water treatment system would be installed. If needed, Russellville Solar would perform initial groundwater drilling and testing to gather information on aquifer characteristics and develop a plan for the production well design. Wells would be constructed using conventional well drilling techniques. A truck-mounted drilling rig would set up at the identified location(s). If necessary, gravel would be used to temporarily stabilize the surface at these location(s). Water-based drilling muds would be collected and dewatered, with runoff occurring locally into nearby field areas. Dewatered muds would be non-toxic and may be spread as subsoil during site grading. If determined necessary, sewer treatment would be accomplished through use of a pump-out septic holding tank.

The design of the tracker support structures could vary depending on the final PV technology and vendor selected. The trackers would likely be attached to driven galvanized steel pile foundations, depending on results of the upcoming geotechnical survey. The piles are driven with a hydraulic ram to a depth typically less than 10 feet. Surface disturbance is typically limited to areas in which the small tractor-sized hydraulic ram machinery operates, including the pile insertion location. Screw piles are another option for PV foundations; these are drilled into the ground with a truck-mounted auger. Screw piles create a similar soil disturbance footprint as driven piles.

The PV modules would be manufactured off-site and shipped to the Project site ready for installation. The AC collection cables would be installed underground throughout the solar facility in trenches three- to four-feet deep and one- to four-feet wide. The trenches would be backfilled with the excavated soil and then compacted. AC collection cables would be installed by boring beneath jurisdictional streams and wetlands and paved roads or as overhead lines mounted on poles. These methods would avoid impacts to jurisdictional waters.

The MPT(s) would be supported on a concrete foundation. An underground or aboveground transmission cable would be constructed to connect the MPT through a circuit breaker. As the solar arrays are installed, the balance of the facility would continue to be constructed and installed, and the instrumentation would be installed. After the equipment is electrically connected, electrical service would be tested, motors would be checked, and control logic would be verified. Once the individual systems have been tested, integrated testing of the Project would occur. Electrical interconnection details are provided in Section 2.2.4.

Vegetative buffer composed of a double row of eight-foot-tall trees would be planted in a staggered pattern around the perimeter of the site approximately 10 feet from the Project site boundaries, where existing natural buffers are not sufficient in shielding views of the facility. A screen would be attached to the security fence for additional visual buffering. Both the vegetative buffer and screen can be waived by landowners having at least 1,000 continuous feet of property adjacent to the Project site, as approved by the Logan County Fiscal Court.

Subject to weather, construction activities would take approximately 14 to 18 months to complete using a crew of up to 450 workers sourced locally to the greatest extent possible. Work would generally occur during daylight hours, Monday through Saturday. Night-time construction could be necessary to make up schedule deficiencies or to complete critical construction activities and would require temporary lighting.

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 facing tracking motion of the solar modules, which amounts to a movement of less than a one degree angle every few minutes. This movement maximizes the collection of solar energy by rotating with the sun and 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. Permanent lighting on site would be required at the substation, operations and maintenance building, and the BESS facility and electrified via the existing PRECC distribution line along Joe Montgomery Road or the TVA TL, per a potential agreement between TVA and PRECC for TVA to supply the power. The lighting would be downward-facing and timer- and/or motion-activated to minimize impacts to surrounding areas. If needed, permanent lighting at the on-site TVA switching station would be fully shielded or would have internal low-glare optics, such that no light is emitted from the fixtures at angles above the horizontal plane, as described in TVA's *Substation Lighting Guidelines* (TVA 2020b).

During operations, the Project may require small groups of workers to be on site occasionally to manage the facility and conduct regular inspections, maintenance, and repairs, as well as some shepherds to manage the on-site sheep herd. Inspections would include identifying any physical damage of panels, wiring, central inverters, transformers, and interconnection equipment, and drawing transformer oil samples. Near the solar facility infrastructure, vegetation would be managed to prevent shading of the PV panels. As part of SRC's Regenerative Energy program (SRC 2021), sheep would be used to maintain low-growing vegetation on most of the fenced solar facility. The sheep would graze the native and/or noninvasive grass and herbaceous

vegetation and be moved between fenced paddocks to maintain appropriate vegetation height and maximize plant and animal diversity. Creation of pollinator and ground-nesting bird habitat would be encouraged by allowing seed heads to reach maturity wherever possible. The sheep would disperse seeds, both on their coats and through their manure, and their movement around the site would establish new plant growth and greater diversity in species composition. This would eliminate much of the need for mowing and selective herbicide application to manage vegetation growth, although these techniques would still be used as necessary, particularly in areas not suitable for grazing. Shepherds would be hired directly or under contract and would be sourced locally, if possible. The sheep would be bred and sold to regional farmers as registered seedstock for breeding or as market lambs.

Precipitation in the region is typically adequate to remove dust and other debris from the PV modules while maintaining energy production; therefore, manual panel washing is not anticipated unless a site-specific issue is identified. If necessary, module washing would occur no more than twice a year and would comply with proper BMPs to prevent any soil erosion and/or stream and wetland sedimentation. The washing is not expected to produce a discharge wastestream.

The proposed solar facility would be monitored remotely to identify any security or operational issues. If a problem is discovered during nonworking hours, a local repair crew or law enforcement personnel would be contacted if an immediate response were warranted.

2.2.4 Electrical Interconnection

Under the Proposed Action, the solar facility would connect to TVA's Springfield-Logan Aluminum 161-kV TL, which crosses the northeast corner of the Project site (Figure 2-5). To interconnect to TVA's existing electrical grid, Russellville Solar would construct the Russellville Solar 161-kV substation, and TVA would initially install a temporary connection tap on the Springfield-Logan Aluminum 161-kV TL and later construct the TVA Cave Springs 161-kV switching station. Together, the substation and switching station would encompass approximately five acres in the northeastern portion of the Project site. Russellville Solar would also construct an approximately 2.3-acre BESS with an estimated rated power capacity of 30 MW and a storage duration of four hours, for a total storage capacity of 120 MW-hours. TVA also proposes to install fiber-optic overhead ground wire (OPGW) along approximately 2,500 feet of the existing Springfield-Logan Aluminum 161-kV TL, to connect existing OPGW at Structure 175 to Structure 173, where the TL meets the Project site. These are referred to herein as the TL upgrade areas.

Russellville Solar and TVA would clear vegetation, remove the topsoil, and grade approximately five acres for the substation and switching station sites. To clear trees and other tall vegetation, Russellville Solar would follow the practices outlined in Section 2.2.2., and TVA would follow its *Site Clearing and Grading Specifications* (TVA 2017a). TVA's work would require use of 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 off-site. Prior to burning, Russellville Solar and TVA would obtain any necessary permits for the substation and switching station, respectively. In some instances, vegetation may be windrowed

along the edge of the Project site to serve as sediment barriers. Further guidance for TVA's clearing and construction activities can be found 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). Three 161-kV breakers would be installed in a ring bus configuration along with associated metering, communication, and protective equipment. The substation and switching station locations would be fenced and graveled and would have lighting to facilitate night access, as described in Section 2.2.3 (TVA 2020b).

Installation of OPGW would be performed either using ground equipment or by helicopter. A lineman would work from structure to structure unclipping the existing OHGW and installing a pulley. Equipment would be placed at either the north or south end of the TL upgrade areas, including the one anticipated OPGW reel (enough to extend 2,500 feet). The OHGW would be removed while a rope is pulled through the newly installed pulleys. Afterward, the lineman would revisit each structure to clip the OPGW to the structure and remove the pulley. Using this method, the OPGW would be installed in approximately two working days, weather permitting.

TL upgrades would require improvements to existing access roads and creation of new temporary access routes. Typically, new permanent or temporary access roads/routes used for TLs are located on the TL ROW wherever possible and are designed and located to avoid severe slope conditions and to minimize impacts to environmental resources such as streams. TL access roads are typically about 12- to 16-foot wide and are surfaced with dirt, mulch, or gravel. Permanent access to the Project substation and switching station would be within the Project site, via Joe Montgomery Road. Matting, culverts and other drainage devices, fences, and gates would be utilized or installed, as necessary. Although not anticipated as a need due to the lack of streams in the TL upgrade areas, culverts installed in any perennial or intermittent streams would be removed following construction, while culverts installed in any ephemeral streams would be either left or removed, depending on the wishes of the landowners or any permit conditions that might apply. If desired by the property owner, TVA would restore new temporary access routes associated with the TL upgrades to previous conditions.

In the temporary connection tap process, TVA would perform electric system modifications to existing TVA substations in support of the additional generation capacity provided by the Project. These modifications, mostly consisting of upgrades to telecommunications equipment, would be performed at Lost City, KY 161-kV substation (S5448), Logan Aluminum, KY 161-kV substation (S5299), Adairsville, KY 161-kV substation (S5801), and Springfield, TN 161-kV substation (S5284). They would require an outage of up to a few days on the Springfield-Logan Aluminum 161-kV TL. TVA would install a temporary connection tap located in proximity to Structure 173 on the Springfield-Logan Aluminum 161-kV TL. This temporary tap would be utilized until the TVA Cave Springs 161-kV Switching Station could be constructed.

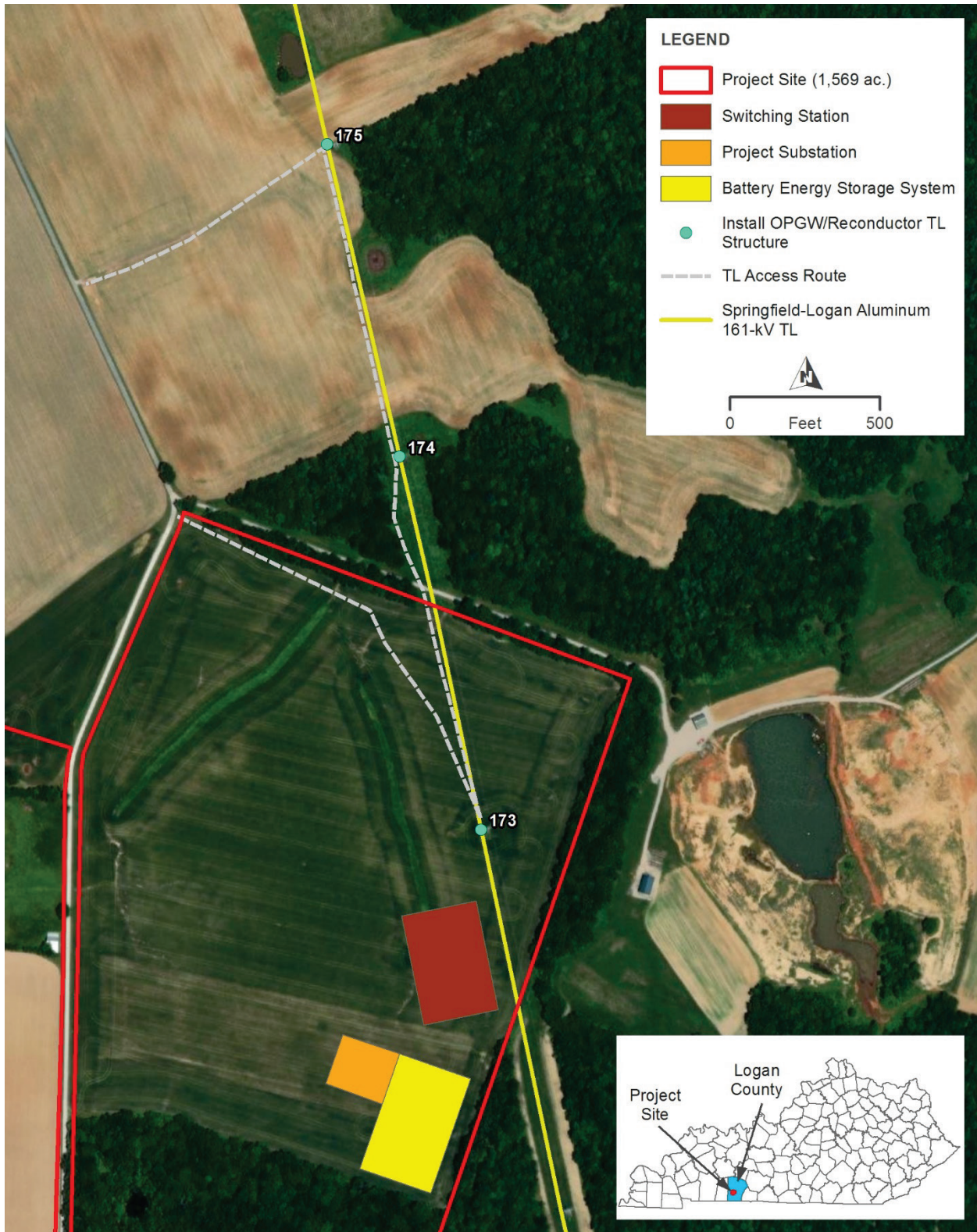


Figure 2-5. Detail of the proposed work areas along the existing Springfield-Logan Aluminum 161-kV TL

2.2.5 Decommissioning and Reclamation

Russellville Solar would operate the Project and sell power to TVA under the terms of a 20-year PPA. As the lease agreement with the landowners is for 40 years, site control would be maintained for longer than a 20-year period. At the end of the 20-year PPA, Russellville Solar would assess whether to cease operations at the solar facility or to replace equipment, if needed, and attempt to enter into a new PPA with TVA or make some other arrangement to sell the power. If the solar facility has not surpassed its useful life, operations and maintenance beyond the 20-year period, additional operations under a new PPA with TVA would be evaluated through separate NEPA review.

When operations cease, the facility would be decommissioned and dismantled, and the Project site would be restored per Project decommissioning requirements. The decommissioning process would be coordinated with Logan County. Decommissioning actions would include the removal of aboveground and below-ground components to a depth of at least three feet. The majority of decommissioned equipment and materials would be recycled. Materials that cannot be recycled would be disposed of at an approved facility in accordance with federal, state, and local laws and regulations. Other wastes, including batteries, will be disposed of off-site and/or recycled in accordance with manufacturer recommendations and appropriate federal, state, and local laws and regulations and industry BMPs. Following component removal and if requested by the landowner, holes would be filled with local soil types, and roads and large excavated rocks would be removed. Overall, the Project site would be returned to a tillable state and revegetating.

2.3 Alternatives Eliminated from Further Consideration

In determining the suitability for development of a site within TVA's service area that would meet customer needs and the goals of expanding TVA's renewable energy portfolio, multiple factors were considered. This process involved screening potential locations and ultimately eliminating those sites that did not have the needed attributes. This process of review and refinement ultimately led to the consideration of the Project site.

The site screening process involves several iterations beginning with the general solar resource (the amount of insolation) and the availability of nearby appropriately sized electric infrastructure for interconnection with sufficient available transmission capacity for the proposed solar facility. This is followed by screening for suitable large-scale landscape features that would allow for utility-scale solar development including:

- Generally flat landscape with minimal slope, with preference given to disturbed contiguous land with no on-site infrastructure or existing tall infrastructure in the immediate vicinity;
- Land having sound geology for construction suitability, with minimal and/or avoidable floodplains or large forested or wetland areas;
- Large contiguous parcels of land with compatible local zoning and located away from densely populated areas; and

- Ability to avoid and/or minimize impacts to known sensitive biological, visual, and cultural resources.

As a result of this screening process, the current Project in Logan County was selected for potential solar development.

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 on the Project site in Logan County, Kentucky. The analysis of impacts in this EA is based on the current and potential future conditions on the properties and the surrounding Project area. A comparison of the impacts of the alternatives is provided in Table 2-1.

Table 2-1. Comparison of Impacts by Alternative

Resource area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative
Land Use	<p>No direct or indirect Project-related impacts on land use.</p> <p>No impacts if existing land uses remained a mix of agricultural and forested land.</p>	<p>Minor, temporary direct impacts on land use due to change from agricultural to solar during construction.</p> <p>Long-term, minor beneficial impacts due to regenerative agricultural practices that would allow for dual land use.</p>
Geology, Soils, and Prime Farmland	<p>No direct or indirect Project-related impacts on geology, soils, and prime farmland.</p> <p>Geology/Soils: Minor impacts if the current land use practices changed or proper BMPs were not followed.</p> <p>Prime Farmland: Minor impacts if agricultural practices continued and proper conservation practices were not followed.</p>	<p>Geology: Minor to moderate direct impacts resulting from implementation of on-site sedimentation basins and utilization of existing terrain with minor or no excavation. The five identified sinkhole fissures/karst features would be avoided by minimum 100-foot buffers.</p> <p>Soils: Minor direct impacts resulting from minor increases in erosion and sedimentation during construction and operations; while in operation, the Project would have beneficial effects to soil health with the use of native and/or noninvasive vegetation.</p> <p>Prime Farmland: Minor direct impacts from removal of 973 acres of prime farmland from row cropping for the duration of the Project. This represents approximately 0.4 percent of farmland in the county. Site can be utilized for row cropping after decommissioning.</p>
Water Resources	<p>No direct Project-related impacts on water resources.</p> <p>Groundwater: Minor indirect impacts if the local aquifers were recharged from runoff containing chemical fertilizers and pesticides.</p> <p>Surface Water and Wetlands: Minor indirect impacts if agricultural practices continued and were not accomplished with proper BMPs.</p> <p>Floodplains: Impacts associated with current land uses would continue.</p>	<p>Groundwater: No direct adverse impacts anticipated; minor beneficial indirect impacts to groundwater due to reduction in fertilizer and pesticide use and planting of native vegetation.</p> <p>Surface Water: Minor direct impacts to one non-jurisdictional intermittent stream (Stream 2) (16 linear feet) and one linear emergent wetland (Wetland L) (0.01 acre) due to the construction of road crossings with culverts. The use of BMPs to properly maintain vehicles will reduce the risk of fuel, lubricant, and hydraulic fluid leaks and spills.</p> <p>Floodplains: Minor direct impacts due to construction of the TL access road.</p>
Biological Resources	<p>No direct or indirect Project-related impacts to natural areas, vegetation, wildlife, or rare, threatened and endangered species. Over time, the open-field areas on the</p>	<p>Natural Areas: No direct impacts due to distance from Project site.</p> <p>Vegetation: Minor direct impacts to vegetation by clearing up to approximately 93 acres of trees and other tall vegetation within the 1,086-</p>

Resource area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative
	<p>Project site could become developed by other entities, and the forested areas could become cleared if the population in the area increases or land uses change.</p>	<p>acre portion of the Project site proposed for development, and some small trees and limb trimming along existing access roads associated with the existing Springfield-Logan Aluminum I 161-kV TL. The effects would be partially offset by revegetating the Project site with native and/or noninvasive vegetation, which would convert large areas of current cropland to more diverse, managed grassland.</p> <p>Wildlife: Minor direct and indirect impacts to common wildlife due to changes to habitat and existence of Project components; the Project is not anticipated to significantly affect populations of migratory bird species of concern. Vegetation management of the site, intended to provide fodder for the sheep, would help maximize animal diversity by creating pollinator habitat and encouraging ground-nesting bird habitat by allowing seed heads to reach maturity wherever possible.</p> <p>Rare, Threatened and Endangered Species: implementation of the Proposed Action is not likely to significantly affect federally listed species, including the three federally listed bat species that have potential in the Project area, and would result in minor to minimal impacts to state-listed species. Consultation with USFWS under Section 7 of the ESA is underway regarding impacts to federally listed species.</p>
<p>Visual Resources</p>	<p>No direct or indirect Project-related impacts on visual resources.</p> <p>Minor impacts to visual resources as nearby community grows or if vegetation were altered by other entities or changed over time.</p>	<p>Temporary, minor impacts on visual resources due to altering the visual character of the Project area and increased activity during construction.</p> <p>During operations, minor direct impacts in the immediate vicinity due to substantial tree buffers in some areas and the installation of a vegetative buffer along the security fence perimeter where existing natural buffers are not sufficient in shielding visual resources; minimal on a larger scale, due to variation of the visual attributes of the Project area as distance from the Project increases.</p> <p>The TL upgrade work would likely result in temporary, minimal to minor impacts to the vantage points near the northeast portion of the Project site due to the use of a helicopter during the installation of OPGW for approximately two days.</p>
<p>Noise</p>	<p>No direct or indirect Project-related impacts on noise.</p>	<p>Temporary, minor adverse impacts to the ambient noise environment in the Project area would occur during construction; minimal to negligible impacts during operation and maintenance.</p>

Resource area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative
Air Quality and GHG Emissions	<p>No direct or indirect Project-related impacts on air quality and GHG emissions.</p> <p>Minor impacts if the Project site were developed by other entities into an industrial or other energy production facility with emissions.</p>	<p>Air quality: Minor, direct impacts to air quality would be anticipated as a result of construction of the Project.</p> <p>GHG emissions: 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 the need for power that would otherwise be generated by the combustion of fossil fuels.</p>
Cultural Resources	<p>No direct or indirect Project-related impacts on cultural resources.</p> <p>Potential minor impacts if Project site were developed by other entities in the future without AHC or tribal consultation.</p>	<p>Archaeological Resources: No impacts on any NRHP-listed or eligible archaeological sites.</p> <p>Architectural Resources: Recommendation of no adverse effect on architectural resources.</p>
Utilities	<p>No direct or indirect Project-related impacts on utilities.</p> <p>Potential short-term, minor impacts if the Project site were developed by other entities in the future.</p>	<p>Potential short-term, minor impacts to local utilities (electricity and telecommunication connections) when bringing the solar facility on-line, the additional electric system modifications to existing TVA substations, or during routine maintenance of the facility.</p> <p>Long-term, minor beneficial impacts to electrical services across the region due to additional renewable energy resources.</p>
Waste Management	<p>No direct or indirect Project-related impacts on waste management.</p> <p>Potential minor impacts if the Project site were developed by other entities in the future with no waste management BMPs.</p>	<p>Minor and temporary impacts during construction due to on site storage and use of petroleum-based oils, fuels, and general construction waste.</p> <p>Minor and long-term beneficial impacts to wastewater due to installation of permanent toilets.</p>
Public and Occupational Health and Safety	<p>No direct or indirect Project-related impacts on public health and safety.</p> <p>Potential minor impacts if the Project site were developed by other entities with no health and safety BMPs.</p>	<p>Minor, temporary impacts during construction that would be minimized with adherence to Occupational Safety and Health Act (OSHA) regulations and health and safety plans.</p> <p>Long-term, minor beneficial impacts to public health and safety during operations due to some permanent staff and/or contract employees required on site to manage the sheep operations and the land, which would help deter squatters from occupying the Project site.</p>
Transportation	<p>No direct or indirect Project-related impacts on transportation.</p>	<p>Minor, temporary direct impacts to transportation during construction that would be minimized through appropriate mitigation.</p>
Socioeconomics	<p>No direct or indirect Project-related impacts on socioeconomics.</p>	<p>Short-term beneficial economic impacts would result from construction, including the purchase of materials, equipment, and services and a</p>

Resource area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative
	Potential minor beneficial or adverse impacts if the Project site were developed by other entities in the future.	<p>temporary increase in employment, income, and population.</p> <p>Positive, long-term, direct impacts to economics and population from Project operations. The local tax base would increase from construction of the solar facility and would be beneficial to Logan County and the vicinity.</p> <p>Positive, long-term direct impacts to the local agricultural economy due to the sheep operations.</p>
Environmental Justice	No direct or indirect Project-related impacts on minority or low-income populations.	No disproportionately high or adverse direct or indirect impacts on minority or low-income populations.

2.5 Best Management Practices and Mitigation Measures

Russellville Solar would implement minimization and mitigation measures in relation to resources potentially affected by the Project. These have been developed with consideration to BMPs, permit requirements, and adherence to the SWPPP.

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 Standard Practices and Routine Measures

Russellville Solar would implement the following minimization and mitigation measures in relation to potentially affected resources:

- Geology and soils
 - 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*, the TVA's BMP manual (TVA 2017b) to minimize erosion during construction, operation, and maintenance activities,
 - Install silt fences 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 off-site during construction;
- Water resources
 - Comply with the terms of the SWPPP prepared as part of the KPDES permitting process,
 - Use BMPs for controlling soil erosion and runoff, such as the use of 50-foot buffer zones surrounding intermittent and perennial streams and wetlands and the installation of erosion control silt fences and sediment traps,
 - Implement other routine BMPs as necessary, such as nonmechanical tree removal within surface water buffers, placement of silt fences 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 surface water and groundwater as identified in TVA (2017a),
 - Use only U.S. Environmental Protection Agency (USEPA)-registered and TVA approved herbicides in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts in areas requiring chemical treatment,
 - Protect intermittent streams by implementing Standard Stream Protection (Category A), Protection of Important Steams, Springs, and Sinkholes (Category B), or Protection of Unique Habitat (Category C) as defined by TVA (2017a),
 - Ensure construction and maintenance activities occur during dry periods as much as possible,

- Ensure construction or improvement of access roads would be done in such a manner that upstream flood elevations would not be increased by more than one foot,
 - Adhere to TVA subclass review criteria for TL upgrade areas in floodplains, by:
 - Improving access roads within the 100-year floodplain in such a manner that upstream flood elevations would not be increased by more than one foot;
 - If hauled off site for disposal, disposing of excavated material outside the 100-year floodway;
 - When the facility is decommissioned and dismantled, depositing deconstruction debris outside the 100-year floodway;
- Biological resources
 - Revegetate with native and/or noninvasive vegetation, including plants attractive to pollinators, to reintroduce habitat, reduce erosion, and limit the spread of invasive species consistent with EO 13112 (Invasive Species) for revegetating with noninvasive plant species as defined by TVA (2017a),
 - Follow U.S. Fish and Wildlife Service (USFWS) recommendations regarding biological resources, including pollinator species,
 - Avoid, to the extent practicable, siting generation equipment and associated infrastructure in areas that support state-listed plant species and rare plant habitats,
 - Use downward facing and timer- and/or motion-activated lighting to limit attracting wildlife, particularly migratory birds and bats,
 - Instruct personnel on wildlife resource protection measures, including (1) applicable federal and state laws such as those that prohibit animal disturbance, collection, or removal, (2) the importance of protecting wildlife resources, and (3) avoiding vegetation disturbance in undisturbed and buffer areas,
 - Minimize impacts to federally listed bat species by maintaining 100-foot avoidance buffers around sinkhole fissures/karst features that may provide bat roosting habitat,
 - Implement Avian Power Line Interaction Committee guidelines to minimize impacts to birds during design and construction of TL system upgrades;
- Visual resources
 - Use downward-facing and timer- and/or motion-activated lighting to minimize impacts to surrounding areas. Use fully shielded and/or low-glare lighting at the operations and maintenance building and the BESS facility as described in TVA's *Substation Lighting Guidelines* (TVA 2020b);
- 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;
- 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
 - Implement BMPs for site safety management to minimize potential risks to workers; and
- Transportation
 - Implement staggered work shifts during daylight hours if needed to manage traffic flow near the Project site.

2.5.2 Non-Routine Mitigation Measures

- Land use and soils
 - Utilize SRC's regenerative energy program, including native and pollinator-attractive plantings, biological vegetation management (e.g., grazing sheep), and other measures that improve the land within the Project area; and
- Visual resources
 - Install vegetative buffer along the security fence perimeter where existing natural buffers are not sufficient in shielding visual resources as described in Ordinance No. 19-920-06, *An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County* (Logan County 2022), and as amended prior to construction start.

2.5.3 TVA Transmission Best Management Practices

TVA utilizes standard practices for transmission and interconnection-related construction activities. These guidance and specification documents are considered when assessing 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* (TVA's BMP manual; TVA 2017b).

These documents are available on TVA's transmission system projects web page (TVA 2020c). TVA transmission projects also utilize BMPs to provide guidance for clearing and construction activities and for lighting for substations and similar facilities, such as the on-site switching station (TVA 2017a and 2020b).

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. 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 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environmental, social, and economic conditions of the Project area and the potential environmental effects that could result from implementing the No Action Alternative or Proposed Action Alternative.

Desktop research of potential past, present, and reasonably foreseeable future actions (RFFAs) in the Logan County, Kentucky area was conducted. Resources examined included:

- local and regional news sources;
- Logan County government websites, including the Chamber of Commerce (Logan County Chamber of Commerce 2022), Logan Economic Alliance for Development (LEAD) (LEAD 2022), and planning commission websites (Logan County 2022); and
- the Kentucky Transportation Cabinet (KYTC) websites (KYTC 2020, 2022).

One federally funded project was identified in Logan County, the US 79 Bridge Replacement project involving replacement of four existing bridges with wider bridges on US 79 between Guthrie and Russellville. Two of the bridges are located in Logan County, south of Russellville; one of these extends over Whippoorwill Creek and the other, over Vick's Branch Creek, approximately two miles and 3.4 miles, respectively, from the Project site. The Whippoorwill Creek bridge replacement involves work from US 79 milepost (MP) 4.35 to 4.85 and the Vick's Branch Creek bridge replacement involves work from US 79 MP 2.912 to 2.93. Both are active KYTC projects in the design phase.

In May 2021, KYTC District 3 published a scoping study for a US 79 widening project between MP 3.00 in Todd County and the intersection of US 79 and the Russellville Bypass at MP 10.71 in Logan County, a total project length of 18.319 miles. Construction is slated to occur in 2026. The primary purpose of this project is to improve freight mobility along this corridor. The project, which would widen the stretch of US 79 in the Project area, is anticipated to stay on the existing highway alignment but require additional ROW acquisition.

For both the US 79 Bridge Replacement project and the US 79 widening project, impacts to the following resource areas would likely be evaluated under NEPA: land use; geology, soils, and prime farmland; water resources; biological resources; visual resources; noise; air quality and GHG emissions; cultural resources; utilities; waste management; public and occupational health and safety; transportation; socioeconomics; and environmental justice. Timewise, the construction of Logan County Solar would potentially coincide with the US 79 Bridge Replacement project but not the US 79 widening project, which is scheduled to begin construction no earlier than 2023.

In addition, there are seven properties in Logan County identified by the TVA Economic Development staff as suitable for industrial development in the near future. These properties consist of the following, all located in Logan County:

- Auburn Hosiery Mills-Auburn, located in Auburn,
- Auburn Industrial Site, located in Auburn,
- Lewisburg Industrial Site, located in Lewisburg,
- Shelton Lane Industrial Park, located in Russellville,
- Camp Property, located near Russellville,
- West Industrial Park, located in Russellville, and
- General Products Building, located in Russellville.

The available industrial sites located nearest the Project site are the West Industrial Park (175 acres) located between US 79 and US 68 near the Russellville Bypass and the Camp Property (376 acres) located along US 79 adjacent to western city limits of Russellville. Both of these sites are also listed as build-ready available property by LEAD. These two sites are owned by the Logan Industrial Development Authority and are currently vacant.

3.1 Land Use

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 purposes. The area surrounding the Project site consists of agricultural, forested, and rural-residential land. Consistent with the surrounding area, imagery data collected from the National Land Cover Database (NLCD) show the Project site as primarily cultivated crops with scattered areas of deciduous forest (MRLC 2016; Table 3-1; Figure 3-1). The 1,569-acre Project site generally consists of flat to gently sloping land that ranges in elevation from approximately 577 to 663 feet above mean sea level. Elevation is higher in the northeastern and central portions of the Project site, decreasing toward the southwest. According to historical aerial imagery and topographic quadrangle maps obtained for a Phase I Environmental Site Assessment (Phase I ESA; Appendix A) completed for the Project site, land use in the Project area has remained relatively unchanged and dominated by agriculture since at least 1950. No parks or other public outdoor recreation facilities occur in the Project area.

Table 3-1. Land cover types within the Project site

NLCD Land Cover Type	Approximate Area (acres)	Percentage of Project Site
Cultivated Crops	1,375	88
Deciduous Forest	123	8
Developed, Open Space	32	2

NLCD Land Cover Type	Approximate Area (acres)	Percentage of Project Site
Hay/Pasture	27	<2
Mixed Forest	5	<1
Woody Wetlands	4	<1
Developed, Low Intensity	2	<1
Open Water	1	<1
Total	1,569	100

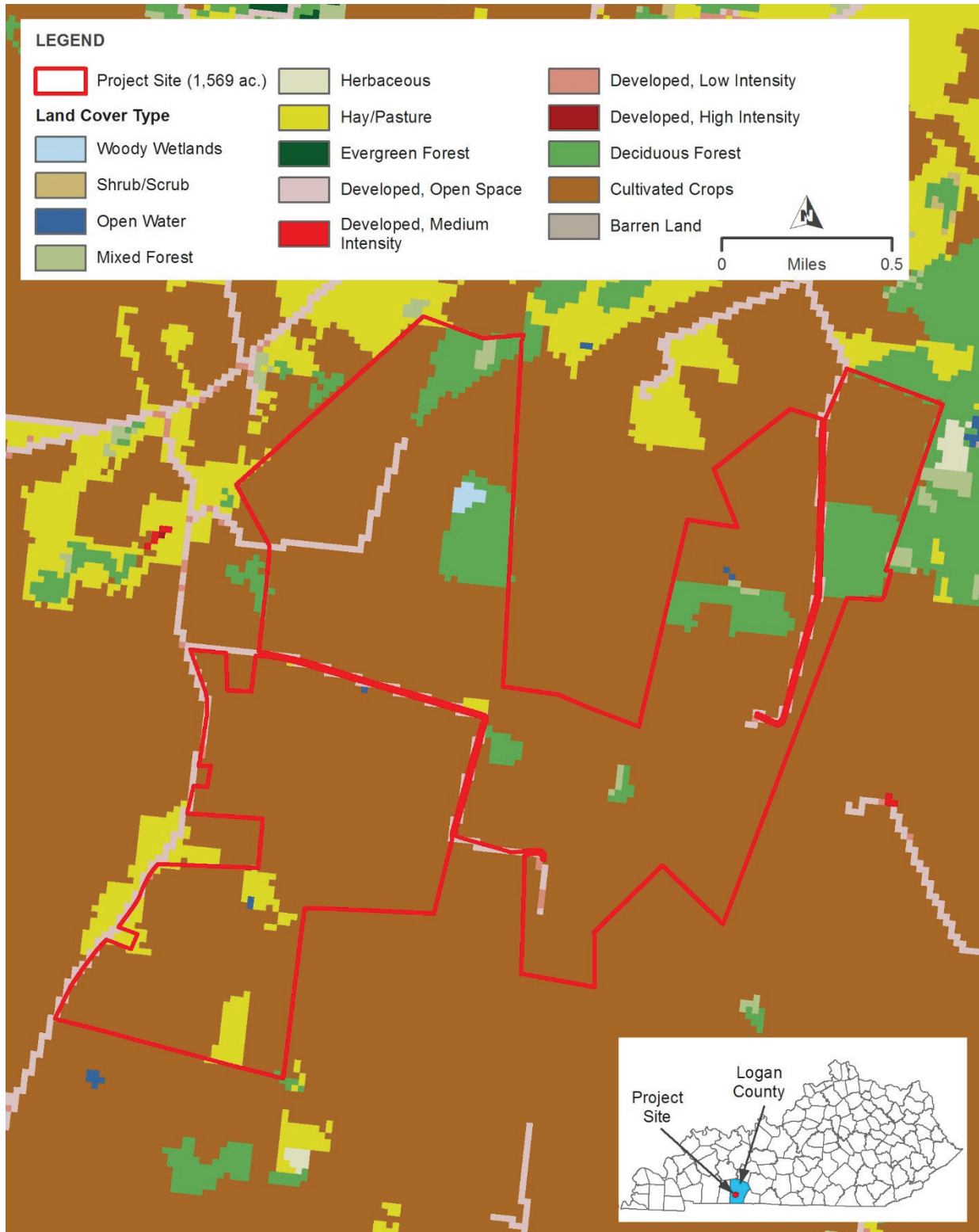


Figure 3-1. Land cover in the Project area

3.1.2 Environmental Consequences

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 use would be expected to remain a mix of agricultural and forested land for the foreseeable future.

3.1.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, the development of the solar facility would result in the long-term change in land use from primarily agricultural dominated by cultivated crops to a combination of industrial and pastoral agricultural land uses. A small portion of the facility site comprising the substation, switching station, and BESS, would change to industrial-only land use. The effect of these changes on adjacent land uses will be minimized by compliance with Logan County Ordinance No. 19-920-06, as amended and adopted on February 22, 2022, in the establishment of vegetative buffers and/or fence screening, where not waived by adjacent landowners, and the Kentucky State Board on Electric Generation and Transmission Siting approval and required minimization and mitigation process (Kentucky Public Service Commission 2022; Logan County 2022). The upgrades to the Springfield-Logan Aluminum 161-kV TL would not change current land uses.

Since the Project is proposed 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.

3.1.2.3 Cumulative Impacts

The RFFAs, such as the proposed industrial developments of West Industrial Park and the Camp Property, would contribute to additional changes in land use from agricultural and forested land to industrial in the area. Logan County does not have a land use plan for the unincorporated portions of the county, nor are lands subject to zoning restrictions. The Proposed Action, when considered with the past, present, and RFFAs, could have minor, cumulative impacts on land use in the area.

3.2 Geology, Soils, and Prime Farmland

3.2.1 Affected Environment

3.2.1.1 Geology

The Project site lies in the Mississippian (Pennyroyal) Plateau Physiographic Region of Kentucky, which consists of a limestone plain characterized by karst terrain (Sauer 1927). The Project area is primarily underlain by Ste. Genevieve and St. Louis limestones, which are characterized as very light to medium gray and brownish gray, dense and fine-grained to coarsely fragmental, thin- to very thick bedded, locally cross-bedded, oolitic, cherty, argillaceous, fossiliferous limestone of Mississippian age (USGS 1968, 1988). In the Project area, some bedrock outcroppings are present, while in the sinkhole depression locations, the bedrock is likely substantially deeper. Typical depth to bedrock in the Project area is approximately 20 feet (KGS 2022a).

The Project site is located on 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. The Kentucky Geological Survey shows four sinkhole depressions and portions of six additional sinkhole depressions, together totaling approximately 20 acres, on the Project site (see State Level Sinkhole Data in Figure 3-2; KGS 2022b). Most of these occur in currently farmed land. Five small sinkhole fissures/karst features appearing like caves in the ground were observed within forested areas during field investigations (see Field Karst Feature Data in Figure 3-2).

3.2.1.2 Paleontology

Kentucky was covered by a shallow, warm sea during the Ordovician age. By the Pennsylvanian age, Kentucky was drier with swamps. Significant paleontological resources are present in Kentucky and the carbonate rocks deposited during the Ordovician age are considered world class sources of fossils. Brachiopods are the most prevalent fossil from this period in Kentucky, but bryozoans are also common (Murray 1974).

3.2.1.3 Geological Hazards

Geological hazards can include landslides, volcanoes, earthquakes/seismic activity, and subsidence/sinkholes. The Project site is located on low undulating terrain. 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.

Given the geology of the site, sinkholes can form as the rock below the surface 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 (Kaufmann 2007).

Seismic activity at the site could cause surface faulting, ground motion, ground deformation, and conditions including liquefaction and subsidence. The Modified Mercalli Scale is used within the United States to measure the intensity of an earthquake. The scale arbitrarily quantifies the effects of an earthquake based on the observed effects on people and the natural and built environment. Mercalli intensities are measured on a scale of I through XII, with I denoting the weakest intensity and XII denoting the strongest intensity. The lower degrees of the scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. This value is translated into a peak ground acceleration (PGA) value to measure the maximum force experienced. The PGA is the maximum acceleration experienced by a building or object at ground level during an earthquake on uniform, firm-rock site conditions. The PGA is measured in terms of percent of "g," the acceleration due to gravity. The U.S. Geological Survey (USGS) Earthquake Hazards Program publishes seismic hazard map data layers that display the PGA with 10-percent probability of exceedance in 50 years (one in 475-year event). The potential ground motion for the Project area is 0.14 g, for a PGA with a two-percent probability of exceedance within 50 years (Figure 3-3; USGS 2014). A 0.14 g earthquake would have a strong perceived shaking with light potential for damage. Based on the USGS 2014 seismic hazard map, the Project site has low risk for earthquakes that would cause structural damage.

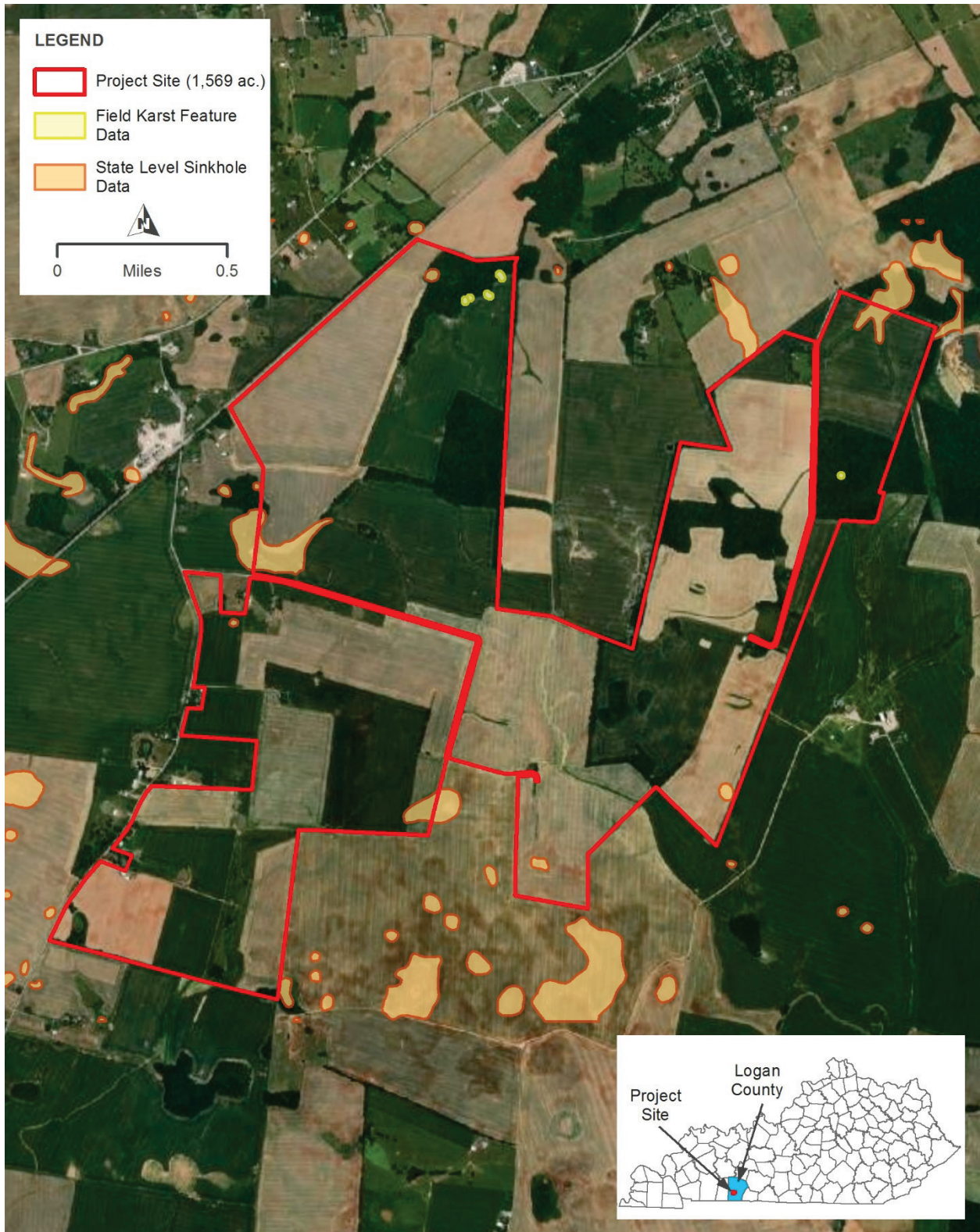
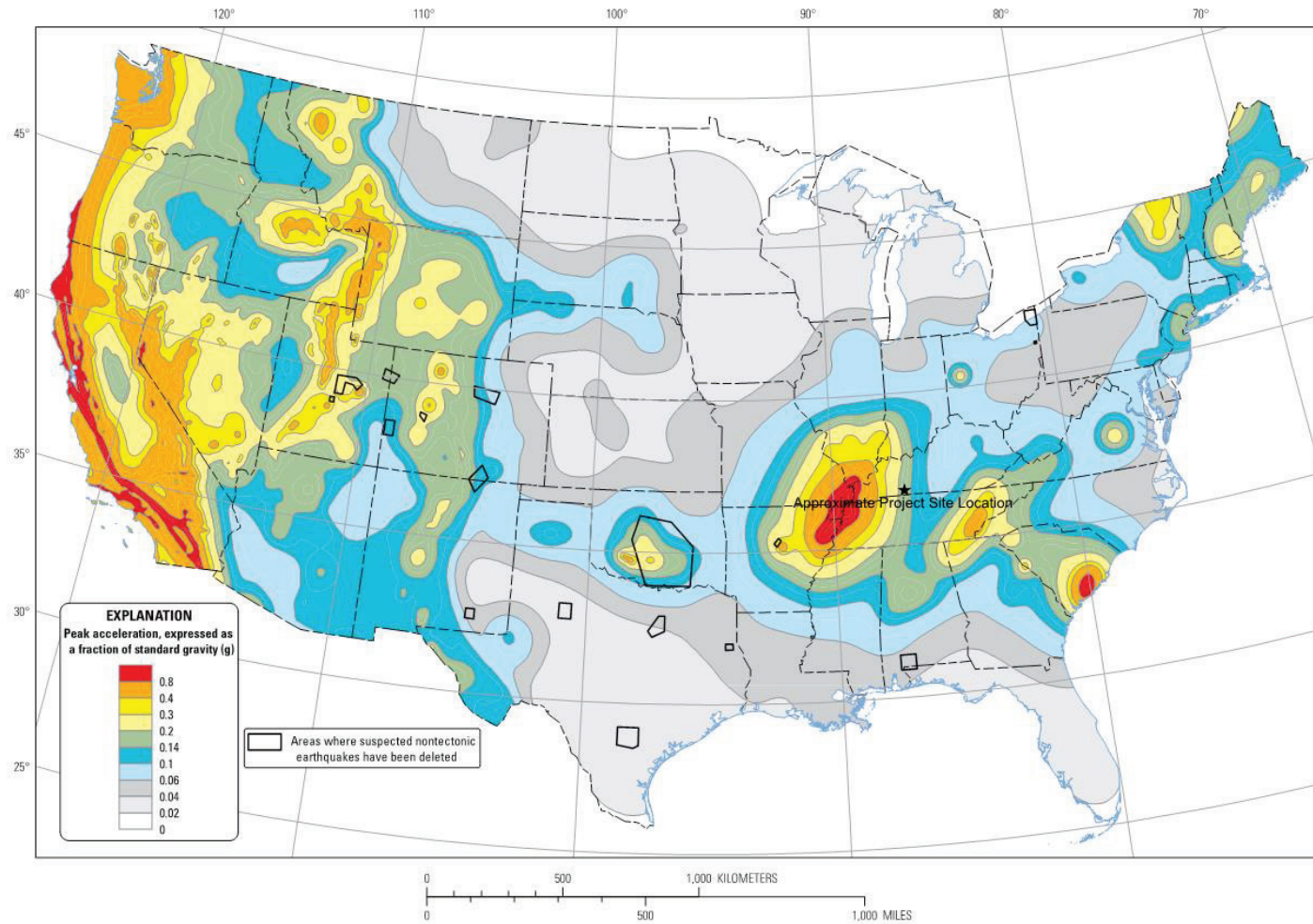


Figure 3-2. Karst features and sinkholes on the Project site



Two-percent probability of exceedance in 50 years map of peak ground acceleration

Figure 3-3. Closest seismic hazard areas to the Project site (USGS 2014)

3.2.1.4 Soils

The Project site contains 16 soil types. The majority of the soils on the Project site are composed of Pembroke silt loams (49.7 percent), Nicholson silt loams (28.5 percent), and Crider silt loams (7.1 percent), with other soil types consisting of less than five percent each (Table 3-2 and Figure 3-4). Most areas (66 to 99 percent) mapped by USDA as Melvin silt loam are considered hydric, while relatively small areas (one and 33 percent, respectively) mapped as Lawrence and Newark silt loams are considered hydric. 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 (USDA 2019).

The Pembroke series consists of very deep, well drained soils formed in a thin silty mantle of loess underlain by older alluvium or residuum of limestone or both. Primary uses are for growing corn, small grains, tobacco, hay, truck crops, fruits, and pasture. The Nicholson series consists of very deep, moderately well drained soils with a slowly permeable fragipan in the subsoil. Nicholson soils are formed in a mantle of loess or silty material underlain by residuum of limestone, calcareous shale, and siltstone. Primary uses are for growing corn, burley tobacco, small grains, truck and fruit crops, hay, pasture, and for urban-suburban development. The Crider series consists of very deep, well drained, moderately permeable soils on uplands. Primary uses are for growing corn, small grains, soybeans, tobacco, hay, truck crops, and pasture (USDA 2021).

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 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.” Prime farmland soils and farmland of statewide importance occur on approximately 1,547 acres, constituting approximately 98.6 percent of the 1,569-acre Project site (USDA 2019; Table 3-2; Figure 3-5).

Table 3-2. Soils on the Project site

Soil type	Farmland classification	Hydric Rating	Area (acres)	Percentage of Project Site
Baxter gravelly silt loam, 12 to 20 percent slopes	Not prime farmland	0	2.0	0.1
Crider silt loam, 0 to 2 percent slopes	All areas are prime farmland	0	58.7	3.7
Crider silt loam, 2 to 6 percent slopes	All areas are prime farmland	0	49.0	3.1

Soil type	Farmland classification	Hydric Rating	Area (acres)	Percentage of Project Site
Crider silt loam, 6 to 12 percent slopes	Farmland of statewide importance	0	4.7	0.3
Lawrence silt loam	Prime farmland if drained	6	36.2	2.3
Lindside silt loam	Prime farmland if protected from flooding or not frequently flooded during the growing season	0	15.7	1.0
Melvin silt loam	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	97	27.4	1.7
Newark silt loam	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	2	75.4	4.8
Nicholson silt loam, 0 to 2 percent slopes	All areas are prime farmland	0	115.7	7.4
Nicholson silt loam, 2 to 6 percent slopes	All areas are prime farmland	0	330.7	21.1
Nolin silt loam	Prime farmland if protected from flooding or not frequently flooded during the growing season	0	54.6	3.5
Pembroke silt loam, 0 to 2 percent slopes	All areas are prime farmland	0	40.6	2.6
Pembroke silt loam, 2 to 6 percent slopes	All areas are prime farmland	0	598.7	38.2
Pembroke silt loam, 6 to 12 percent slopes	Farmland of statewide importance	0	140.0	8.9
Pembroke silty clay loam, 6 to 12 percent slopes, severely eroded	Not prime farmland	0	4.0	0.3%
Pickwick silty clay loam, 6 to 12 percent slopes, severely eroded	Not prime farmland	0	12.3	0.8
Total Prime Farmland			1,402.7	89.4
Total Farmland of Statewide Importance			144.7	9.2

Source: USDA 2019

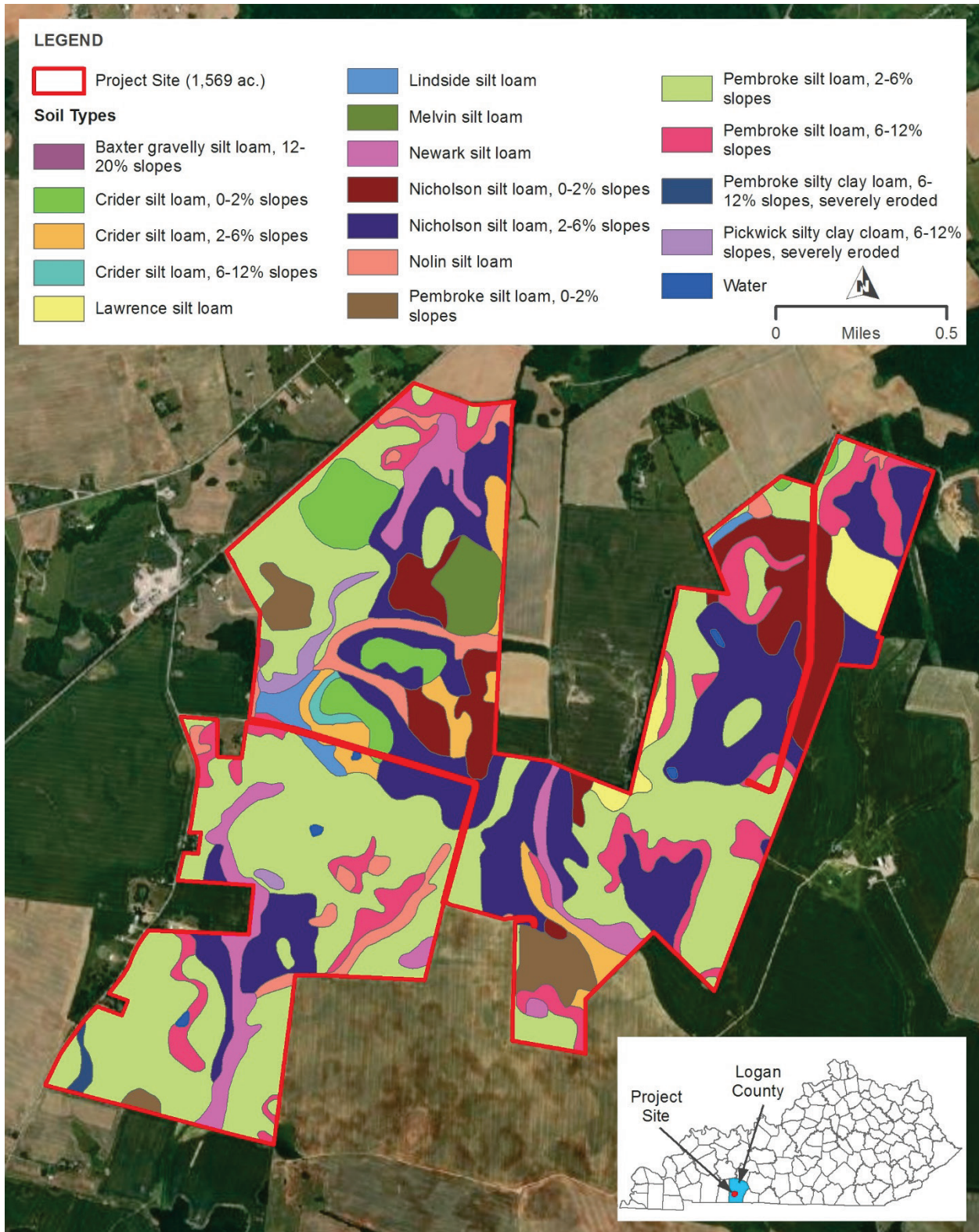


Figure 3-4. Soils on the Project site

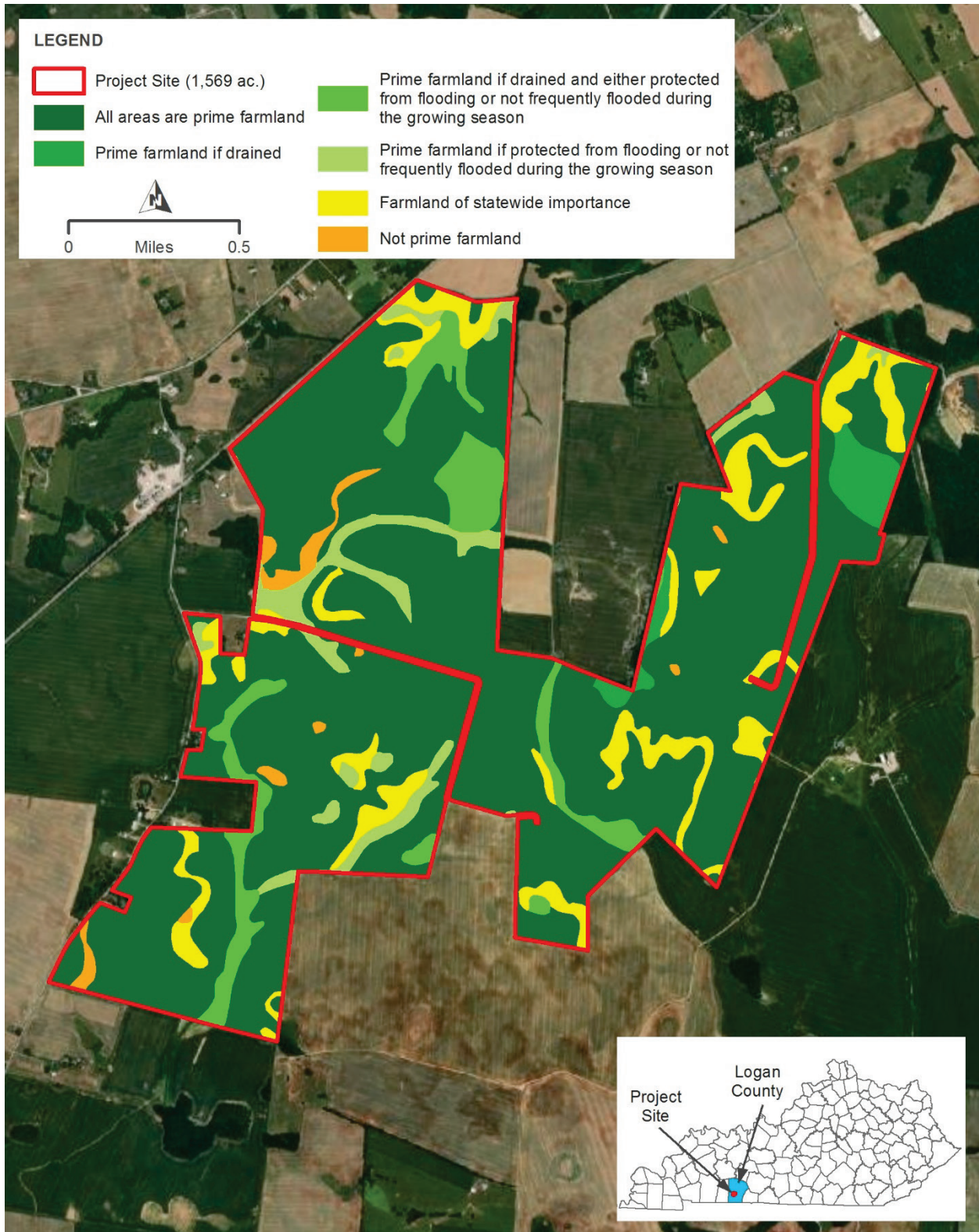


Figure 3-5. Soils classified as prime farmland on the Project site

3.2.2 Environmental Consequences

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no direct or indirect Project-related impacts on geological, paleontological, soil resources, or prime farmlands would result. Existing land use on the Project site would 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. If the Project site were to be developed by other parties, changes to the soils on site would occur.

3.2.2.2 Proposed Action Alternative

Under the Proposed Action, direct impacts to geology, soil, and prime farmland resources would occur as a result of construction and operation of the Project. Approximately 69 percent (1,086 acres) of the 1,569-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.

3.2.2.2.1 Geology and Paleontology

Under the Proposed Action, minor to moderate impacts to geological resources could occur with placement of Project components. If needed, on-site sedimentation basins would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive excavation. Minor excavations would also be required for construction of the Project substation, switching station, each medium voltage transformer, and the BESS. The Project would not likely site these atop rock outcroppings present on the Project site, and these Project components would not overlap with known sinkhole features.

The solar arrays would be supported by steel piles, which would either be driven or screwed into the ground to a depth typically less than 10 feet. The PV panels would be connected with underground wiring placed in trenches approximately three- to four-feet deep. Except for very small areas of overlap of the steel piles, fencing, and access roads, as described in the next section in more detail, the Project component disturbance footprint would avoid sinkholes mapped by the Kentucky Geological Survey, and no impacts to the five identified sinkhole fissures are anticipated, as these would be avoided by minimum 100-foot protective buffers. Some of the steep piles may penetrate bedrock, given the existence of some rock outcroppings on the Project site; however, depth to bedrock in the vicinity is typically 20 feet, and sinkhole depressions are likely underlain by deeper bedrock. Thus, given the small areas of overlap, only minimal to minor effects to sinkhole features are anticipated. These are expected to be minimized and mitigated with regular maintenance activities.

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

3.2.2.2.2 Geologic Hazards

Hazards resulting from geological conditions may be encountered in the case of sinkholes. The Project site is located over limestone bedrock that is susceptible to erosion and the creation of sinkholes. The Project site contains five sinkhole fissures/karst features observed in the field and four whole and portions of six additional sinkhole depressions mapped by the Kentucky Geological Survey. Portions of the security fencing, solar panel block, and access roads would be constructed in the locations of three mapped sinkhole depressions. The overlapped areas range from 0.3 to 0.95 acre and together amount to approximately 2.5 acres. The Project site has a low risk for earthquakes that may cause structural damage. A geotechnical study has occurred on site (Appendix A), and more detailed studies are planned. The Project would be designed to comply with applicable standards to minimize issues pertaining with sinkholes and seismic activity. Geological hazard impacts on the site would be unlikely to impact off-site resources.

3.2.2.2.3 Soils

During construction, soils on the 1,086 acres proposed for development of the solar facility would be disturbed from site preparation and construction activities. The construction of access routes for TL upgrades would also affect soils; these impacts would be temporary and mitigated through BMPs identified in Section 2.5. Any stockpiled soils from the area where vegetation clearing and grading occurs, including topsoils, would be replaced following cut-and-fill activities to the extent practical and, therefore, likely not require off-site hauling of soils. However, some minimal off-site hauling may be necessary. Although not anticipated, should borrow material such as sand, gravel, rip rap, or other aggregate, such as large rocks, be required for Project site activities, these resources may be obtained either from on-site sources, if available, or from nearby permitted off-site sources.

The creation of small areas of new impervious surface (individual surface areas ranging from 0.01 to 2 acres, together amounting to approximately 10 acres), in the form of foundations for the central inverters and the Project substation, switching station, the BESS, and associated components, would result in a minor increase in stormwater runoff and potential increase in soil erosion. Planting of native and/or noninvasive vegetation, including plants attractive to pollinators, within the limits of disturbance along with use of BMPs described in the SWPPP (see Section 1.3), 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 facility operations.

During operation and maintenance of the solar facility and associated interconnection facilities, minor disturbance could occur to soils. Routine maintenance would include periodic motor replacement; inverter air filter replacement; fence repair; vegetation control; and periodic PV array inspection, repairs, and maintenance. The Project would use grazing sheep to manage vegetation within most of the fenced-in, developed solar facility area. Selective spot applications of herbicides may be employed around facilities and 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 during operations.

3.2.2.2.4 Prime Farmland

Approximately 69 percent (1,086 acres) of the 1,569-acre Project site would be developed into the solar facility and would no longer be suitable for row crops. This would affect approximately 973 acres of prime farmland and approximately 69 percent of the total prime farmland soils at the Project site. This represents approximately 0.4 percent of farmland in Logan County (USDA 2017). Because the construction and operation of the solar facility would have little effect on the productivity of soils on the site and most of the site would be utilized for grazing sheep, which would be shepherded by local or regional contract or direct personnel and sold as seedstock or market lambs, impacts to prime farmland would be minimal. Following decommissioning of the solar facilities, the site could be utilized for a variety of types of agricultural production, including row cropping.

3.2.2.3 Cumulative Impacts

Land use changes from agricultural to industrial, due to the small amount of new impervious surface, would likely not inhibit groundwater infiltration and recharge to the local aquifer. The RFFAs such as the proposed industrial developments of West Industrial Park and the Camp Property, together with the Proposed Action, would remove approximately 2,035 acres of farmland, some of which is designated as prime farmland, from potential use for row cropping. While the Project site would support grazing sheep, these permanent changes to farmland in the form of lack of potential for row cropping, would affect approximately 0.7 percent of the farmland in Logan County (USDA 2017), resulting in minor, cumulative impacts on prime farmland in the area.

3.3 Water Resources

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. Aquifers have sufficient permeability to conduct groundwater infiltration and to allow economically significant quantities of water to be produced by man-made water wells and natural springs. One water well was noted on the Project site during a Phase I ESA field visit, at the southern extent of Joe Montgomery Road.

According to USGS, the Project area overlies the Kentucky karst Midwest Paleozoic Carbonate aquifer system. Groundwater in the area can be affected by agricultural pumping and local surface water bodies but is expected to flow southwest toward the Red River. Multiple small ponds occur within the Project area and are expected to serve as groundwater recharge points.

Karst aquifer drainage patterns resemble the branching pattern formed by streams flowing over insoluble rocks, which differentiates the karst aquifer from a granular or fractured bedrock aquifer. A karst spring is a discharge point for an underground watershed that is filled by water drainage of sinkholes and sinking streams. Because of the nature of the underground stream formation, karst aquifers have little relationship to topographic highs and lows of the surface (Kentucky Geological Survey 2021).

3.3.1.2 Surface Water and Wetlands

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. (WOUS 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 WOUS under Sections 402, 404, and 401. The limits on activities affecting WOUS are defined through a jurisdictional determination accepted by USACE. State agencies have jurisdiction over water quality.

The Project site is located in the Dry Fork-Whippoorwill Creek Watershed (12-digit Hydrologic Unit Code [HUC] 051302060303) and the Pleasant Grove Creek-Red River Watershed (12-digit HUC 051302060205) of the Lower Cumberland-Red River watershed (8-digit HUC 05130206) (USGS 2022a). The on-site surface waters in the western portions of the site drain to an unnamed intermittent tributary and then into Whippoorwill Creek, while the on-site surface waters in the eastern portions of the site drain to an unnamed ephemeral tributary and then into Pleasant Grove Creek (USGS 2022b). Both of these named streams drain to the Red River. On-site streams are all intermittent or ephemeral streams.

Field surveys were conducted July 9 and 10, 2019, to determine the presence of jurisdictional wetlands and streams across the Project site (Appendix B). Wetlands were identified in accordance with methodologies described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (1987 Manual) (USACE 1987) and the 2012 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 05-05. Descriptions of the on-site water resources identified during the field survey on July 9 and 10, 2019, were initially submitted to USACE for confirmation of their jurisdictional status in July 2019. Following a site visit by USACE staff to verify the survey results on October 10, 2020, descriptions of the on-site water resources identified during the field survey were resubmitted to USACE, and the changes were confirmed in an Approved Jurisdictional Determination from USACE (Appendix B). A total of 12 wetlands (11 acres), 15 ponds (7.8 acres), two intermittent streams (6,135.1 linear feet), and 9 ephemeral streams (4,233 linear feet) were identified during the field surveys (Table 3-3; Table 3-4; Table 3-5; Figure 3-6). Three ephemeral streams (Stream 11, 12, and 13) and two wetlands (Wetland A and H) were verified by USACE to be jurisdictional waters. A subsequent field survey was conducted on October 25, 2021, to determine the presence of jurisdictional wetlands and streams in the TL upgrade areas. No additional jurisdictional waters were delineated during the October survey. A memorandum report was written to update the delineation findings for the Project (Appendix B).

TVA is subject to EO 11990, Protection of Wetlands. Wetlands were classified by hydrologic regime and vegetation cover type in accordance with the Cowardin Classification System (Cowardin et al. 1979). Table 3-3 lists the classification for each wetland. See Cowardin et al. 1979 for further descriptions on each classification type.

Table 3-3. Wetlands on the Project site

Wetland Identifier	Type¹	USACE Jurisdictional	Acres
Wetland A	PFO	Yes	0.95
Wetland B	PEM	No	1.11
Wetland C	PFO	No	0.88
Wetland D	PEM	No	0.15
Wetland E	PEM	No	0.14
Wetland F	PFO	No	1.84
Wetland G	PEM	No	0.18
Wetland H	PEM/PSS	Yes	0.45
Wetland J	PFO	No	3.27
Wetland K	PFO	No	0.97
Wetland L	PEM	No	0.74
Wetland N	PFO	No	0.35
Total Acres			11.03

¹ Classification codes as defined in Cowardin et al. (1979)

PEM = Palustrine emergent; PFO = Palustrine forested; PSS = Palustrine Scrub Shrub

Table 3-4. Ponds on the Project site

Pond Identifier	Acres
Pond 1	0.92
Pond 2	0.71
Pond 3	0.42
Pond 4	0.46
Pond 5	0.70

Pond Identifier	Acres
Pond 6	0.25
Pond 7	0.81
Pond 8	0.23
Pond 9	0.70
Pond 10	0.31
Pond 11	0.26
Pond 12	0.26
Pond 13	0.29
Pond 14	0.76
Pond 15	0.74
Total Acres	7.82

Table 3-5. Streams on the Project site

Stream Identifier	Type	USACE Jurisdictional	Linear Feet
Stream 1	Ephemeral	No	207.24
Stream 2	Intermittent	No	4,598.61
Stream 3	Intermittent	No	1,536.52
Stream 4	Ephemeral	No	186.46
Stream 5	Ephemeral	No	365.25
Stream 10	Ephemeral	No	170.77
Stream 11	Ephemeral	Yes	778.40
Stream 12	Ephemeral	Yes	1,466.20
Stream 13	Ephemeral	Yes	685.24
Stream 14	Ephemeral	No	325.13
Stream 15	Ephemeral	No	47.85
Total Linear Feet			10,367.67

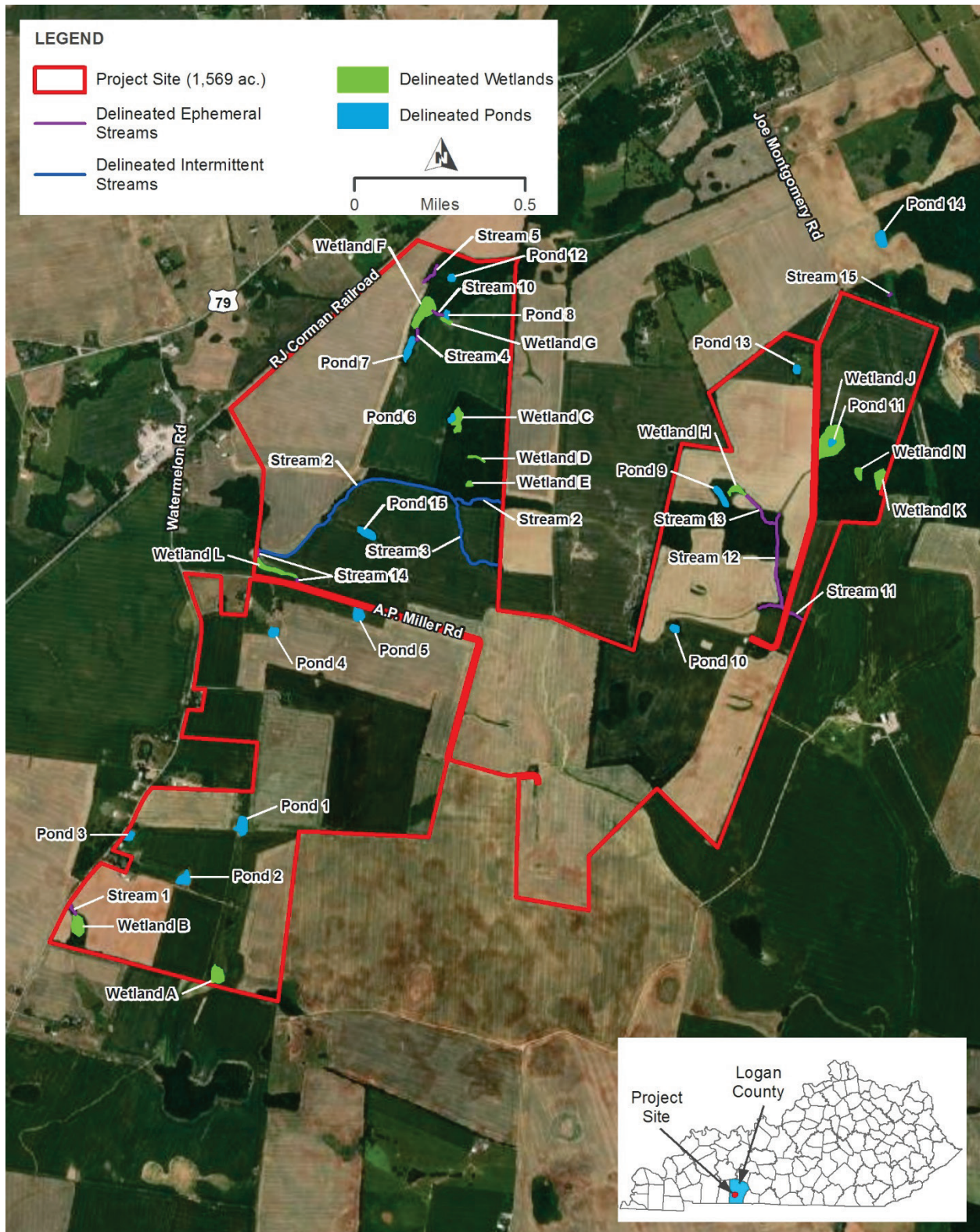


Figure 3-6. Delineated wetlands, streams, and ponds on the Project site

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 a floodplain to ensure that the Project is consistent with EO 11988, Floodplain Management.

Based on Flood Insurance Rate Map Panels 21141C0275D and 21141C0270D (effective date October 2, 2012), most of the Project site is outside the Federal Emergency Management Agency (FEMA)-identified 100-year and 500-year floodplains (Figure 3-7; FEMA 2017). A small section of a 100-year floodplain, associated with a karst feature as shown on topographic maps, lies within the northeastern portion of the Project site and overlaps the TL upgrade areas.

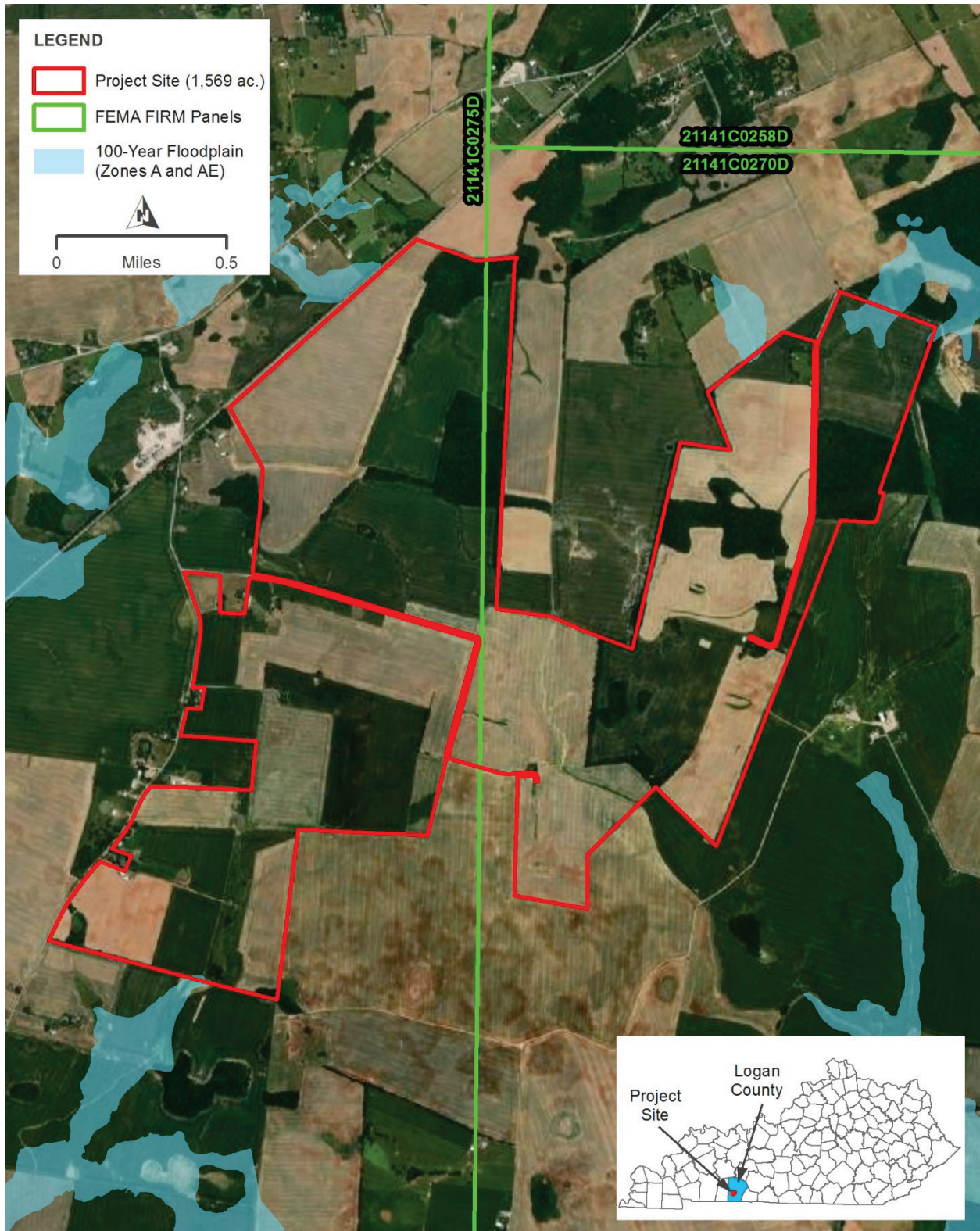


Figure 3-7. Floodplains in the Project area

3.3.2 Environmental Consequences

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 forested 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. Erosion and sedimentation on site 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, chemical fertilizer and pesticide use could impact both the surface water and groundwater.

3.3.2.2 Proposed Action Alternative

Under the Proposed Action, minor direct impacts to streams and wetlands would result from construction and operation of the Project. Beneficial, indirect impacts to groundwater and surface water could result from the change in land use and establishment of permanent vegetative cover on 1,086 acres of the 1,569-acre Project site, including a reduction in fertilizer and pesticide runoff and the improvement of water quality by filtering through vegetation.

3.3.2.2.1 Groundwater

No direct adverse impacts to groundwater would result from the Proposed Action. The PV panels would have a little 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 and operations. The minimal use of petroleum fuels, lubricants, and hydraulic fluids during construction and by maintenance vehicles during operations would result in the potential for small on-site 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 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.

3.3.2.2.1.1 Construction-related Water Needs

Water and sewer treatment services are currently not available at the Project site. However, both are anticipated as on-site needs during construction. 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 wells are selected, Russellville Solar would conduct 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.

3.3.2.2.1.2 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, if needed, for on-site staff. The internal access roads would not be heavily traveled during normal operations, and consequently, water use for dust control is not expected. Equipment washing and any potential dust control discharges would be handled in accordance with BMPs for water-only cleaning. Precipitation in the area is typically adequate to minimize the buildup of dust and other matter on the PV panels that would reduce energy production; therefore, no regular panel washing is anticipated.

Water needs during operations 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.

3.3.2.2.1.3 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 based on conditions as found at the time of facility closure.

The Project would comply with the requirements of the KPDES through preparation and implementation of a SWPPP and filing of a NOI to comply with the General Construction Stormwater KPDES 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. See Section 2.2.5 for additional information on the decommissioning process.

3.3.2.2.1.4 Overall Groundwater Impacts

Due to the small volume of groundwater anticipated as necessary for the Project in comparison to the anticipated withdrawal rate for the Kentucky karst Midwest Paleozoic Carbonate aquifer, impacts to the local aquifer and groundwater in general are not anticipated. The use of BMPs and a SWPPP would reduce the possibility of any on-site hazardous materials reaching the

groundwater during operations or maintenance. Overall, impacts to groundwater are not anticipated.

Indirect beneficial impacts to groundwater could occur if panel placement and/or the use of buffer zones lead to fewer pollutants entering groundwater. Currently, most of the on-site land use is agricultural, which provides for the possibility of fertilizer and pesticide runoff entering groundwater. Thus, the conversion of the Project site from cropland to native and/or noninvasive vegetative cover would eliminate a source of these impacts, resulting in a beneficial, though minor, indirect impact to groundwater.

3.3.2.2.1.5 Cumulative Impacts

The RFFAs such as the West Industrial Park and the Camp Property would contribute to additional changes in land use from agricultural and forested land to industrial in the area. This change may inhibit groundwater infiltration and recharge to the local aquifer. According to USGS, the Project area overlies the Kentucky karst Midwest Paleozoic Carbonate aquifer system. If the industrial land use includes paving the land surface and diverting surface water, then groundwater recharge would be expected to be lowered in the area. Cumulative impacts of past, present, and RFFAs, together with the Proposed Action, would be expected to be minor.

3.3.2.2.2 Surface Water and Wetlands

Under the Proposed Action, minor, temporary, direct adverse impacts to surface waters are expected to occur, with the use of BMPs, including maintenance of avoidance buffers around intermittent streams and all wetlands, to minimize sediment runoff during construction. Figure 3-8 illustrates stream, wetland, and pond locations relative to Project components. During the facility design process, impacts to on-site streams were avoided or minimized to the extent practicable. Care was also taken to avoid impacts to wetlands, where practicable; therefore, this Project is consistent with the requirements of EO 11990, Protection of Wetlands. However, complete avoidance of surface waters was not feasible, and the construction and operation of the Project would permanently affect approximately 16 linear feet of one non-jurisdictional intermittent stream (Stream 2) and approximately 0.01 acre of one non-jurisdictional emergent linear wetland (Wetland L) due to the construction of road crossings using culverts. The construction of the road crossings in the on-site waters would be conducted with adherence to BMPs to minimize effects. Work in the linear wetland would be completed in compliance with wetland mandates that deter significant effects. Impacts to jurisdictional waters are not anticipated from the installation of buried cables due to the use of boring or overhead methods to install these Project elements.

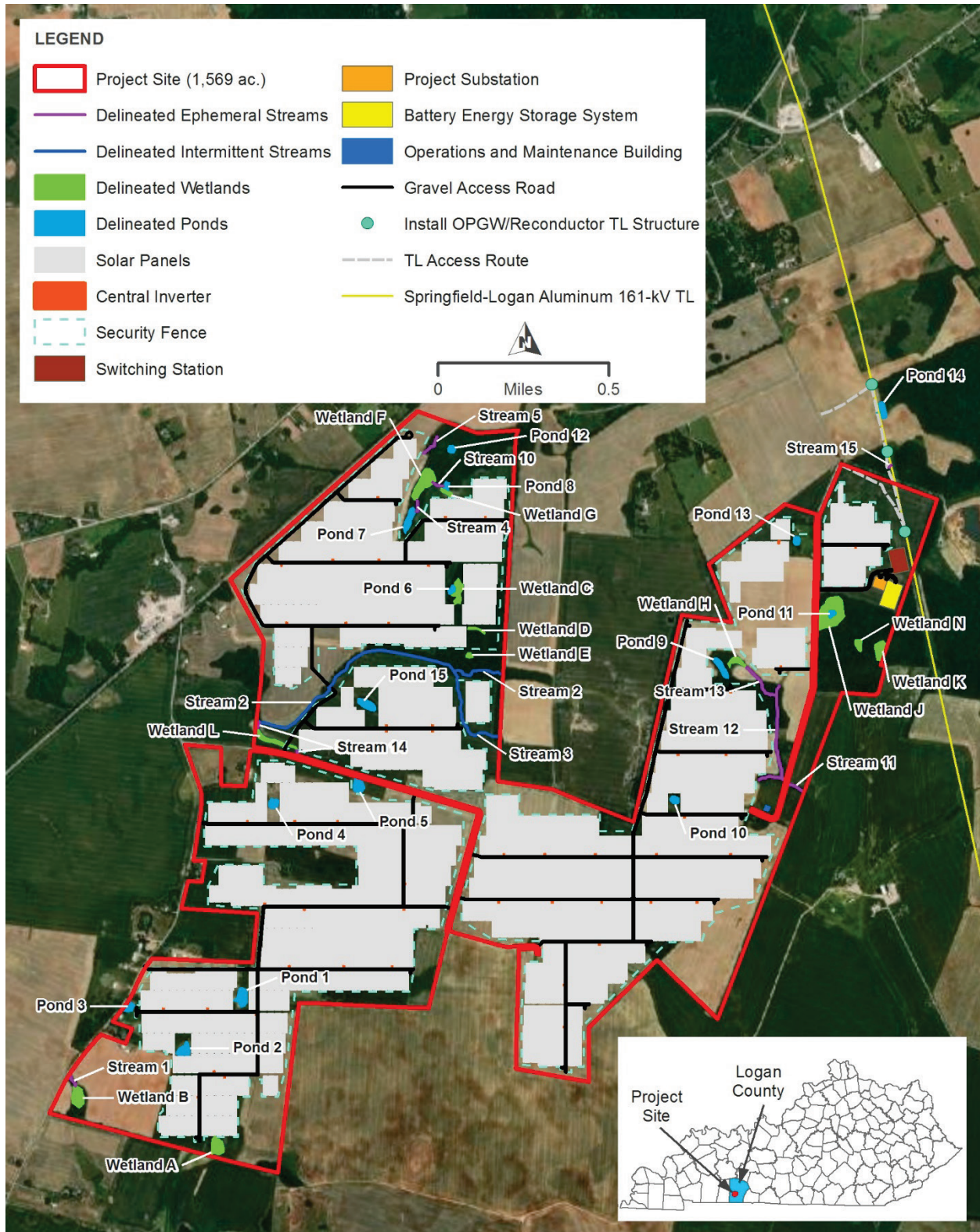


Figure 3-8. Proposed Project components in relation to delineated wetlands, streams, and ponds on the Project site and Transmission Line Upgrade Areas.

3.3.2.2.1 Cumulative Impacts

As depicted on Figure 3-8, the Project is anticipated to result in impacts to approximately 16 linear feet of a non-jurisdictional intermittent stream and the fill of approximately 0.01 acre of a non-jurisdictional wetland for road crossings, and no direct impacts to jurisdictional streams or wetlands. Following construction of the facility, the existing functional capacity of the overall wetland area where the fill would occur is anticipated to be sustained, continuing to contribute similar functions and values to downstream waters. While none are anticipated at this time, if jurisdictional stream or wetland impacts could not be avoided by the Project, these would be permitted through USACE, as discussed in Section 1.4, and the work would be conducted with adherence to BMPs and compliance with wetland mandates that deter cumulative effects.

Cumulative impact analysis of wetland and stream effects takes into account waterbody loss at a watershed scale currently and within the reasonable and foreseeable future. The RFFAs within the affected watersheds would affect approximately 551 acres and approximately 18 miles of road right-of-way. These developments consist of road improvement projects and industrial complexes. Similar to the Project, these developments would also be subject to CWA jurisdiction, ensuring current and foreseeable wetland impacts are considered, permitted, and/or mitigated in accordance with wetland regulations. This regulatory oversight ensures maintenance of the chemical, biological, and physical integrity of the aquatic environment, including wetlands, within these watersheds for the long term. Cumulative effects are considered in the CWA permitting process to ensure individual waterbody impacts do not collectively result in degradation to WOUS, including jurisdictional wetland and stream resources. Due to implementation of BMPs and adherence to NWP conditions and wetland mandates, the Project is not anticipated to contribute to cumulative stream and wetland impacts at the watershed scale.

3.3.2.2.3 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" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

The solar facility components, Project substation, BESS, switching station, and operations and maintenance building would be located outside FEMA-identified 100-year floodplains, which would be consistent with EO 11988. Portions of the access road associated with the TL upgrades would be located within 100-year floodplains. Consistent with EO 11988, access roads are considered to be repetitive actions in the 100-year floodplain that would result in minor impacts. OPGW would be installed on one existing transmission structure that is located within the 100-year floodplain. Installing OPGW is considered to be a repetitive action in the 100-year floodplain and would result in minor impacts (TVA 1981).

With implementation of the following mitigation measures, which would also serve to minimize adverse impacts, the Proposed Action would be consistent with EO 11988 and have no significant impacts on floodplains and their natural and beneficial values:

1. Standard BMPs would be used during construction activities;
2. To the extent practicable, TL construction and maintenance activities would be scheduled during dry periods;
3. Any road improvements within the 100-year floodplain would be done in such a manner that upstream flood elevations would not be increased by more than one foot;
4. If hauled off site for disposal, excavated material would be disposed of outside the 100-year floodway;
5. When the facility is decommissioned and dismantled, deconstruction debris would be deposited outside the 100-year floodway;
6. The TL ROW would be revegetated if vegetation is removed; and
7. Construction activities would employ other standard measures for TL upgrades in floodplains, per TVA's 1981 review of repetitive actions occurring in floodplains.

3.3.2.2.3.1 Cumulative Impacts

Considering the activities and facilities described in the Chapter 3 Introduction, along with the Project, cumulative impacts to floodplains and their natural and beneficial values are expected to be minor because the only facilities, structures, and activities that would be located within the floodplain are a portion of the TL access road and OPGW on the existing TL structure. Other development that could result from construction and operation of the Project would be subject to Logan County floodplain regulations.

3.4 Biological Resources

3.4.1 Affected Environment

The Project area lies in the Interior Plateau Level III ecoregion, while the Project site is located within the Western Pennyroyal Karst Plain Level IV ecoregion (USEPA 2022a). This ecoregion is underlain by Middle Mississippian limestones and is extensively farmed. Sinkholes, ponds, springs, sinking streams, and dry valleys occur. Potential natural vegetation is mapped as a mosaic of bluestem prairie and oak–hickory forest. Barrens (i.e. bluestem prairies) were once more widespread than elsewhere in Kentucky.

Desktop surveys were performed prior to field investigations on the Project site and in TVA's TL upgrade areas. Potential vegetation, wildlife, and threatened and endangered species were researched during the desktop surveys, and habitat assessments were conducted by HDR and Austin Peay State University biologists, between May 17 and 19, 2021, and October 17 and 25, 2021, to verify whether habitat for these species occurs on the Project site and TL upgrade areas (Appendix C; HDR 2022). Field investigations included bat habitat assessments to determine the potential for bat habitat and mapped results. The findings of the desktop surveys and field investigations are described in this section.

Biological resources are regulated by several federal laws. The laws and rules potentially relevant to the Proposed Action are described below in Table 3-6.

Table 3-6. Laws and rules potentially relevant to the Proposed Action

Law and/or Rule	Definition
Endangered Species Act (ESA) (16 U.S.C. §§ 1531-1544)	Prohibits importing, exporting, taking, possessing, selling, and transporting endangered and threatened species. The ESA also provides for designation of critical habitat and prohibits the destruction of that habitat.
Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. §§ 703-712) (for actions of nonfederal entities)	The MBTA establishes a federal prohibition against the following activities, unless permitted by regulations: to pursue, hunt, take, capture, kill, attempt to take, attempt to capture or kill, offer for sale, sell, offer to purchase, purchase, deliver, transport any migratory bird. This includes any part, nest, of egg of migratory birds.
Executive Order for Migratory Birds (EO 13186 of January 10, 2001) (for actions of federal agencies)	This executive order directs federal departments and agencies to take certain actions to conserve migratory birds and implement the MBTA. This executive order requires that each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, with 2 years, a Memorandum of Understanding with the Fish and Wildlife Service that shall promote the conservation of migratory bird populations.

To identify federally and state-listed threatened and endangered species potentially occurring in the Project area, lists obtained from TVA’s Regional Natural Heritage Database (RNHD), USFWS Information for Planning and Consultation (IPaC), and Office of Kentucky Nature Preserves (KNP) Kentucky Biological Assessment Tool (KYBAT; KNP 2021) were compiled between March and June 2021 and reviewed.

3.4.1.1 Natural Areas

According to the TVA RNHD, three natural areas are known to exist within three miles of the Project site. Baker Natural Area is located approximately three miles northeast of the Project site and is a 66-acre remnant grassland and glade ecosystem owned and managed by the Logan County Conservation District (KEEC 2022). This area is used for environmental education and is open to the public. The 14-acre Katie White Barrens Natural Area (Lockett) is located approximately 0.7 mile northeast of the Project site. Approximately 1,097 acres within three miles of the Project site have been set aside as agricultural conservation easements through the state’s Purchase of Agricultural Easement Corporation (Kentucky Department of Agriculture 2022). There are no known natural areas located within the Project site.

3.4.1.2 Vegetation

In the Project area, including the entirety of Logan County, forested areas encompass approximately 38,493 acres, or 10.8 percent of the overall county area. Most of these are mixed

forests (53.6 percent of forested areas in county), with some deciduous forest (39 percent) and some evergreen forest (7.4 percent).

The field survey of the Project site, conducted between May 17 and 19, 2021, focused on documenting plant communities, invasive plants, and conducting habitat assessments for rare, non-forest plant species and all other state and federally listed species in the Project site. The majority of the Project site is agricultural land used for corn and winter wheat production that lies on gently rolling karst plain underlain by limestone. Using the National Vegetation Classification System (Grossman et al. 1988), the field survey documented three forest types in the Project site, including four large, forested areas representative of the Appalachian-Interior-Northeastern Mesic Forest macrogroup (M883). Forested areas comprise approximately 11 percent of the Project site, and the majority of large contiguous forested areas are located in the northern portion of the Project site. Other small, forested areas are located along field margins and drainage ways and in upland areas.

Table 3-7 provides a summary of the vegetation community types as defined by Grossman et al. (1988), with five of the community types occupying less than one percent of the Project site. Dominate tree species within the forested areas include common hackberry, mockernut hickory, pignut hickory, shagbark hickory, sugar maple, red maple, tulip poplar, white ash, American elm, black walnut, black locust, honey locust, southern red oak, eastern cottonwood, post oak, black oak, eastern red cedar, and black walnut. The small flower baby blue eyes occurs in the Appalachian-Interior-Northeastern Mesic Forest vegetation community and the cypress-knee sedge occurs in the Central Hardwood Swamp Forest and the Eastern North American Marsh, Wet Meadow and Shrubland vegetative communities.

Table 3-7. Vegetation communities on the Project site and TL upgrade areas

Macro Group Level Vegetation Community Code	Vegetation Community	Area (acres)	Percentage of Project Site
CFO04	Row and Close Grain Crop Cultural Formation	1365.7	87
M883	Appalachian-Interior-Northeastern Mesic Forest	139.6	9
M013	Eastern North American Ruderal Forest	33.7	2
CSC02	Herbaceous Agricultural Vegetation Cultural Subclass	18.1	1
M503	Central Hardwood Swamp Forest	8.2	>1
CSC04	Agricultural & Developed Aquatic Vegetation Cultural Subclass	6.7	>1
CFO09	Lawn, Garden, & Recreational Vegetation Cultural Formation	3.5	>1

Macro Group Level Vegetation Community Code	Vegetation Community	Area (acres)	Percentage of Project Site
M303	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland	1.9	>1
M069	Eastern North American Marsh, Wet Meadow and Shrubland	1.8	>1

See Grossman et al. 1988 for a description of each vegetation community.

3.4.1.2.1 Non-Native and Invasive Plants

No federal-noxious weeds (USDA 2012) were observed, but many non-native invasive plant species were observed throughout the Project site. In addition to tall fescue, invasive species observed within the Project site include Japanese honeysuckle, wintercreeper, Japanese stiltgrass, musk thistle, johnson grass, Oriental lady’s thumb, Chinese privet, beefsteak plant, garlic mustard, poison hemlock, Asiatic dayflower, and multiflora rose. These species were most often found in ruderal forested areas, along field edges, and in areas prone to disturbance. Japanese honeysuckle, wintercreeper, Japanese stiltgrass, Oriental lady’s thumb, Chinese privet, and multiflora rose were found scattered in some of the forested stands. These species represented less than five percent of the vegetation communities they were present within on the Project site.

3.4.1.3 Wildlife

Each of the vegetative communities described in the prior section offers suitable habitat for animal species common to the region, both seasonally and year-round. Individual species and/or evidence of species observed during field investigations are listed in Table 3-8. Likely due to the fact that the Project site and vicinity are largely farmland, most species observed during the field investigations are widespread and relatively common in the area.

Table 3-8. Wildlife Species Observed on the Project Site

Species Observed (Common Name)	Notes/Habitat Observed in Study Area
Birds	
American Crow	Observed flying and perching on power poles
American Robin	Observed widely across site, home sites
Barn Swallows	Observed inside farm barns throughout
Eastern Bluebird	Observed flying over cropland
Blue Grosbeak	Observed in shrub areas
Northern Cardinal	Observed in forested stands
Common Grackle	Observed widely across site
Common Nighthawk	Observed flying off ground nest in wheat field
Downy Woodpecker	Observed and heard in forested stands
Eastern Wood-Pewee	Observed in forested stands

Species Observed (Common Name)	Notes/Habitat Observed in Study Area
Eastern Phoebe	Observed in forested stands
Eastern Towhee	Observed in forested stands
Great Blue Heron	Observed flying over site
Indigo Bunting	Observed in forested stands
Mallard	Observed in pond in the SW portion of site
Mourning Dove	Observed and heard widely across site
Northern Bobwhite	Observed flying over cropland
Pileated Woodpecker	Observed and heard in forested stands
Prothonotary Warbler	Observed in large forested stands
Red-winged Blackbird	Observed foraging in winter wheat fields
Savannah Sparrow	Observed on utility poles and over ag. fields
Tufted Titmouse	Observed near a home site
Wild Turkey	Observed at edge of forest
Black Vulture	Observed in barns where likely nesting, and flying over site
Wood Duck	Observed in a few ponds on site
<i>Amphibians</i>	
Cricket Frog	Heard near sinkhole pond wetlands in NE
Bullfrog	Heard and observed in a few ponds on site
Spring Peeper	Heard in a few wetlands
American Toad	Observed throughout forested stands
<i>Reptiles</i>	
Common Snapping Turtle	Observed in pond
<i>Insects</i>	
Carpenter bee	Observed in many barns on site
Swallowtail Butterfly	Observed in forested edges throughout site
Monarch Butterfly	Observed in northeast forested/powerline edge
<i>Mammals</i>	
Cottontail Rabbit	Observed near where forested edge meet corn field
Big Brown Bat	Captured by mist net within forested area
Eastern Red Bat	Captured by mist net within forested area
Evening Bat	Captured by mist net within forested area
<i>Tracks/Scat/Remains</i>	
Deer Track	Observed along streams and drainageways
Raccoon Track	Observed along streams and drainageways

Deciduous forests, which comprise approximately 11 percent of the Project site provide habitat for an array of terrestrial animal species (National Geographic 2002). Birds found in this habitat include the pileated woodpecker, red-tailed hawk, blue jay, cardinal, and American robin, all of which were observed during field investigations. Some forested areas also provide foraging and roosting habitat for several species of bats, particularly in areas where live trees exhibit exfoliating bark and/or dead-tree snags with crevices are present. Some examples of common bat species potentially found in this habitat are the big brown, eastern red, evening, hoary, and silver-haired. The coyote, eastern chipmunk, eastern woodrat, North American deer mouse, and woodland vole are other mammals potentially present in such deciduous forests (Kays and Wilson 2002). Common reptiles include the gray ratsnake, midland brownsnake, and eastern black kingsnake (Powell et al. 2016). In forested portions with water features, amphibians may include the dusky, marbled, or spotted salamanders, as well as Cope's gray tree frog (Powell et al. 2016).

Wetlands and associated vegetation areas, which compose approximately two percent of the Project site, provide habitat for such birds as the prothonotary warbler, northern harrier, red-winged blackbird, song sparrow, swamp sparrow, and white-throated sparrow (National Geographic 2002). Mammals that may utilize this habitat include the American beaver, eastern harvest mouse, marsh rice rat, muskrat, and swamp rabbit (Kays and Wilson 2002). The eastern black kingsnake, eastern ribbonsnake, common gartersnake, midland watersnake, and gray ratsnake are all potential wetland reptiles (Powell et al. 2016). The eastern red-spotted newt and three-lined salamander, as well as the American bullfrog, green frog, northern cricket frog, pickerel frog, and southern cricket frog are examples of some amphibians that may be present in wetlands on the Project site (Powell et al. 2016).

Croplands, hayfields/pastureland, and other herbaceous areas such as lawns, which together comprise approximately 89 percent of the 1,569-acre Project site and the approximately 10-acre TL upgrade areas offer habitat to such bird species as the blue grosbeak, brown-headed cowbird, brown thrasher, common grackle, common yellowthroat, dickcissel, eastern bluebird, eastern kingbird, eastern meadowlark, eastern towhee, field sparrow, grasshopper sparrow, house finch, and northern mockingbird among others (National Geographic 2002). Mammals potentially present in fields or pasture include the eastern cottontail, eastern harvest mouse, eastern woodrat, hispid cotton rat, red fox, and striped skunk (Kays and Wilson 2002). Reptiles with the potential to occur in agricultural portions of the Project site include the eastern milk snake, gray ratsnake, and southern black racer. (Powell et al. 2016).

Review of the TVA RNHD indicated that no caves were documented within a three-mile radius of the Project site. Although no caves were observed within the Project site, five limestone sinkhole fissures/karst features, appearing like caves in the ground, were present during the field investigations, indicating the potential for bat roosting habitat.

3.4.1.3.1 Migratory Birds

EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to conserve migratory birds and 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 executed and enforced by USFWS. Logan County Solar and its contractors would act in compliance with the MBTA.

The previous discussion of wildlife lists many migratory birds known or likely to occur on the Project site. The Project site is located within the Bird Conservation Region 24 (BCR 24), Central Hardwoods (NABCI 2020), where 23 species are identified as birds of conservation concern (USFWS 2021b). These species are not listed under ESA but are a high conservation priority of the USFWS, and without additional conservation action, are likely to become candidates for listing under ESA. Thirteen of the 23 species are likely to occur within the Project site based on the presence of their suitable habitat as described in Table 3-9 below.

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. The suitability of the Project site as habitat for the bald eagle is not likely due to the absence of large water bodies, where nest sites concentrate (KDFWR 2021). The golden eagle is a rare winter resident in south-central Kentucky, and most reports of it have been in the vicinity of reservoirs. Wintering habitat includes a mix of forest, open habitats for foraging. The Project area encompasses suitable winter roosting and foraging habitat; therefore, the golden eagle could potentially occur in the Project area.

Table 3-9. Migratory bird species of concern potentially occurring in the Project area

Common Name	Scientific Name	General Habitat Description	Habitat on Project Site?
Migrant Species (present as spring and fall migrant and/or during winter)			
Bald Eagle	<i>Haliaeetus leucocephalis</i>	Nest in forested areas adjacent to large bodies of water. For perching they prefer tall coniferous or deciduous trees.	Not likely
Golden Eagle	<i>Aquila chrysaetos</i>	Winters in a mix of forest. Forages over open habitats.	Yes, limited
Lesser Yellowlegs	<i>Tringa flavipes</i>	Winters and migrates along mudflats, sandy beaches, shores of lakes and ponds, and wet meadows.	Yes, limited
Bobolink	<i>Dolichonyx oryzivorus</i>	Grasslands, meadows, and hayfields.	Yes, limited
Rusty Blackbird	<i>Euphagus carolinus</i>	Winters in swamps, wet woodlands, and pond edges.	Yes, limited
Semipalmated Sandpiper	<i>Calidrus pusilla</i>	Winters and migrates along mudflats, sandy beaches, shores of lakes and ponds, and wet meadows.	Yes, limited
Breeding Season Migrants (may occur only during the breeding season)			
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Woodlands with open understory.	Yes

Common Name	Scientific Name	General Habitat Description	Habitat on Project Site?
Chimney Swift	<i>Chaetura pelagica</i>	Forages over variety of habitats, requires chimneys or large hollow tree snags with open tops for nesting	Yes
Bewick's Wren (Eastern)	<i>Thryomanes bewickii bewickii</i>	Overgrown fields, fencerows, woodland edges, often around buildings.	Yes, limited
Prairie Warbler	<i>Dendroica discolor</i>	Various shrubby habitats, including regenerating forests, brushy fields, and Christmas tree farms	Yes
Wood Thrush	<i>Hylocichla mustelina</i>	Breeds in mature deciduous and mixed forests, forests with dense understory, and forest edges.	Yes
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Grasslands, meadows, and hayfields.	Yes, limited
Resident Species (may occur year-round)			
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Deciduous woodlands with oak or beech, groves of dead or drying trees, river bottoms, recent clearings, farmland, grasslands, forest edges and roadsides	Yes
Field Sparrow	<i>Spizella pusilla</i>	Old fields and brushy areas.	Yes

Source: USFWS 2021b

3.4.1.4 Rare, Threatened, and Endangered Species

Threatened and endangered species are regulated by both the federal and state governments. Database research identified three federally listed bats and two federally listed mollusk species with the potential to occur in the Project area. Two additional federally listed mollusks are known to be historic for the county. No designated critical habitats are present on the Project site. Thirty-seven species have state protective statuses or were identified by the botanist conducting the plant field survey as locally rare species. The tables in the subsections that follow describe the preferred habitat of each federally listed and state-status species and whether potential habitat is present on the Project site.

3.4.1.4.1 Federally Listed Species

Federally listed species identified during database research as having the potential to occur in Project area are shown in Table 3-10 (KNP 2021; TVA 2021, USFWS 2021a). These consist of seven species, consisting of three bats and four aquatic species, all mollusks, that are federally listed as either threatened or endangered. According to the USFWS IPaC database, no federally listed plants occur within Logan County (USFWS 2021a). Additionally, KYBAT has no records of any federally listed plants within five miles of the Project site (KNP 2021). The presence of such species is unlikely due to the predominance of highly managed agricultural land and the presence of significant populations of nonnative invasive plants in the forested areas. Moreover, a mist net survey for federally listed bats conducted on site in May and June 2021 resulted in no listed bat species being caught (Appendix C).

Table 3-10. Federally listed species potentially occurring in the Project area

Common Name	Scientific Name	Federal Status ¹	Preferred Habitat	Habitat on Project Site?
Mammals				
Gray Bat	<i>Myotis grisescens</i>	E	Roosts in caves year-round and connecting sinkhole fissures/karst features. Various foraging habitats including wet meadows, damp woods, and uplands.	Yes, limited to five onsite karst fissures and one concrete well
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	T	Spend winter hibernating in caves and mines, called hibernacula. Suitable summer migratory 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 (PRT). A PRT has exfoliating bark, cracks, crevices or cavities that are greater than or equal to 3-inch diameter at breast height (DBH).	Yes
Indiana Bat	<i>Myotis sodalis</i>	E	Spend winter hibernating in caves and mines, called hibernacula. Suitable summer migratory tree-roosting bat habitat consists of the presence of suitable (i.e., open enough for bats to access) drinking and foraging areas with PRT. A PRT has exfoliating bark, cracks, crevices or cavities that are greater than or equal to 5-inch DBH.	Yes
Mollusks				
Snuffbox Mussel	<i>Epioblasma triquetra</i>	E	Small to medium sized rivers in areas with a swift current	No
Little-wing Pearlymussel	<i>Pegias fabula</i>	E ²	Inhabits cool, clear, and relatively high gradient streams where it is found lying on a rocky stream bed in shallow water	No
Smooth Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	T	Typically, in small to medium rivers with moderate to swift currents	No
Slabside Pearlymussel	<i>Pleuroonia dolabelloides</i>	E ²	Found primarily in large creek to moderately sized rivers. Generally observed in gravel substrates within interstitial sand, with moderate current.	No

Sources: KNP 2021, TVA 2021, USFWS 2021a; also USFWS 1997, 2006, 2015

¹ E= Endangered, T= Threatened, SSC= Species of Special Concern

² Historic for County; not listed on ECOS IPAC range shapefile (USFWS 2021a)

3.4.1.4.2 State-Listed Species

State-listed species, species of special concern, and potentially locally rare species identified during database research or in preparation of field surveys as having the potential to occur in Project area are shown in Table 3-11 (KNP 2019, 2021; TVA 2021). These consist of 19 plants; 15 aquatic species, including six mollusks, four fish, four snails, and one lamprey; and three terrestrial species, all birds. KNP provided species with potential to occur within one mile of the

Project site, while the TVA RNHD database search encompassed a three-mile radius for terrestrial wildlife species and a five-mile radius for plant species. One species, small flower baby blue eyes, was not in the KNP database results for the Project area; however, this species is included in the statewide list of threatened, endangered, and special concern species (KNP 2019).

Table 3-11. State-listed species potentially occurring in the Project area

Common Name	Scientific Name	State Status	Preferred Habitat	Habitat on Project Site
Birds				
Loggerhead Shrike	<i>Lanius ludovicianus</i>	SSC	Old field, grassland/herbaceous, savanna, cropland/hedgerows, perches on fence posts.	Yes
Bachman's Sparrow	<i>Peucaea aestivalis</i>	E	Early successional areas with scattered saplings (often pines), bushes, or understory, brushy or overgrown hillsides, overgrown fields with thickets and brambles.	Yes
Common Barn Owl	<i>Tyto alba</i>	SSC	Herbaceous wetlands, riparian areas, grasslands, cropland, caves, human habitation.	Yes
Fish				
Blotched Chub	<i>Erimystax insignis</i>	E	Medium to large clear streams with moderate flow over clean gravel and cobble substrates.	No
Smallscale Darter	<i>Etheostoma microlepidum</i>	E	Small rivers with shallow riffles and gravel substrates in the Lower Cumberland River drainage.	No
Flame Chub	<i>Hemitremia flammea</i>	E	Springs, shallow seepage waters, and spring-fed streams usually over gravel in areas where aquatic vegetation is abundant.	No
Redspotted Sunfish	<i>Lepomis miniatus</i>	T	Swamps, oxbow lakes, creeks, and small to moderately sized rivers. Usually associated with vegetation as well as muddy and sandy benthic.	No
Mollusks				
Elktoe	<i>Alasmodonta marginata</i>	T	Small creeks and streams.	No
Tennessee Clubshell	<i>Pleurobema oviforme</i>	E	Moderate flow streams.	No
Purple Lilliput	<i>Toxolasma lividus</i>	E	Riffle habitats in small to medium-sized rivers and creeks.	No
Mountain Creekshell	<i>Villosa vanuxemensis</i>	T	Endemic to Tennessee and Cumberland River systems.	No
Mammoth Cave Crayfish	<i>Orconectes pellucidus</i>	SSC	Subterranean streams, cave systems.	Yes
Mud River Crayfish	<i>Orconectes ronaldi</i>	No Status	Subterranean streams, cave systems, small rivers with cobble and gravel.	No
Lamprey				

Common Name	Scientific Name	State Status	Preferred Habitat	Habitat on Project Site
Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>	SSC	Medium and large rivers, large reservoirs, larvae burrow in bottom of smaller streams with moderate current.	No
Snails				
Onyx Rocksnail	<i>Leptoxis praerosa</i>	SSC	Medium sized rivers, on rocks in riffles with good flow.	No
Rugged Hornsnail	<i>Pleurocera alveare</i>	SSC	Restricted to large rivers with solid substrates.	No
Shortspire Hornsnail	<i>Pleurocera curta</i>	SSC	Smaller rivers and streams.	No
Whitewashed Rabdotus	<i>Rabdotus dealbatus</i>	T	Open glades and meadows.	No
Plants				
Broadwing Sedge	<i>Carex alata</i>	T	Open wet prairies and sinkhole swamps.	Yes
Cypress-knee sedge	<i>Carex decomposita</i>	T	Swamps, sinkhole ponds, often on floating logs or cypress knees.	Yes
Carlina Larkspur	<i>Delphinium carolinianum</i>	T	Dry woods, prairies, and sandhills.	No
Hairy Fimbristylis	<i>Fimbristylis puberula</i>	T	Only glades and dry rocky prairies.	No
Upland Swamp privet	<i>Forestiera ligustrina</i>	T	Soils near/on rocky slopes and along streams in barrens and glades.	No
Sharp-scaled Manna-grass	<i>Glyceria acutiflora</i>	E	Wetlands and pond fringes.	Yes
Plain's Rush	<i>Juncus filipendulus</i>	T	Wet limestone glades.	No
Necklace Glade-cress	<i>Leavenworthia torulosa</i>	T	Limestone glade outcrops.	No
Small Flower Baby Blue Eyes	<i>Nemophila aphylla</i>	T	High-nutrient rich forest with history of disturbance.	Yes
Sundrops	<i>Oenothera triloba</i>	T	Limestone glades and dry gravelly outcrops.	No
Soft False Gromwell	<i>Onosmodium molle ssp. molle (Lithospermum molle)</i>	H	Dry prairies, glades, and limestone bluffs.	No
Limestone Fame-flower	<i>PheMERanthus calcaricus</i>	E	Limestone glade outcrops.	No

Common Name	Scientific Name	State Status	Preferred Habitat	Habitat on Project Site
White Heath Aster	<i>Symphotrichum priceae</i>	E	Limestone and glade outcrops.	No
Blue Wild-indigo	<i>Baptisia australis</i> var. <i>minor</i>	SSC	Glades, barrens, prairie patches and open woodlands.	No
Purple Prairie-clover	<i>Dalea purpurea</i>	SSC	Dry prairies and limestone barrens.	No
Hair Grass	<i>Muhlenbergia glabrifloris</i>	SSC	Mesic to wet prairie remnants, occurs in areas of repeated disturbance.	Yes
Prairie-dock	<i>Silphium pinnatifidum</i>	SSC	Dry prairies and glades and occasionally found in mesic prairies.	No
Barrens Silky Aster	<i>Symphotrichum pratense</i>	SSC	Dry prairies and glades.	No
Eggleston's Violet	<i>Viola egglestonii</i>	SSC	Limestone glade outcrops.	No

Sources: Office of Kentucky Nature Preserves 2019, 2021 (Rare Species by County); TVA 2021

E= Endangered, T= Threatened, H=Historic, -- = Not Listed/recently discovered, SSC= Species of special concern

Two state-listed plant species was documented on the Project site. A small population of cypress-knee sedge was found in a high-quality sinkhole swamp community. Specimens of this sedge were found growing on bases of emergent trees and also as free-standing tussocks in shallow water. This sedge was absent from other ponds on site, as most onsite ponds are either man-made or affected by agricultural practices. This plant community is vulnerable, with relatively few populations or occurrences known. The other state-listed species, the small flower baby blue eyes, was found in several locations with some occurrences consisting of large colonies. Kentucky is at the northern edge of the range of this species and has been previously documented in Fulton and Hickman counties in western Kentucky (Shaw et al. 2021). Habitat for this species includes nutrient-rich forests with a history of disturbance, and it is generally a weedy species with broad ecological tolerance. On the Project site, the plant occurred in the Appalachian-Interior-Northeastern Mesic Forest community in areas with trees that appear to be less than 40 years old. The survey report concluded that this species has likely been widely overlooked in prior botanical surveys and is fairly common in the Project vicinity.

Two other state-listed plants were found just outside the Project site, but suitable habitat for them exists on the Project site. The broadwing sedge occurs in open wet prairies and sinkhole swamps. Specimens were identified within 750 feet of the Project site and suitable habitat exists on the Project site around the sinkhole pond east of Montgomery Road and along thin wet woods on the eastern site border. The sharp-scaled manna grass was also collected approximately 750 feet of the Project site. Suitable habitat exists around the sinkhole pond east of Joe Montgomery Road where it could occur in the seedbank.

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

Under the No Action Alternative, there would be no Project-related impacts to natural areas, vegetation, wildlife, or rare, threatened and endangered species. Existing agricultural areas on the Project site would likely remain in agricultural production, and prairie species would continue to use the area for habitat. Over time, the open-field areas on the Project site could become developed, and the forested areas could become cleared if the population in the area increases or land uses change.

3.4.2.2 Proposed Action Alternative

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

3.4.2.2.1 Natural Areas

The Proposed Action is not anticipated to have any impacts on the biological resources associated with natural areas in the vicinity because of the nature of the Proposed Action and the distance of these areas from the Project site.

3.4.2.2.2 Vegetation

Under the Proposed Action, the solar facility would have direct impacts to vegetation. With the exception of avoidance buffers surrounding wetlands, intermittent streams, and sinkhole fissures/karst features, trees within the fenced-in area of the solar facility would be removed for grading and to prevent shading of the solar arrays. These trees total about 93 acres of forested land. Vegetation would also be removed for the construction of the proposed Project substation, switching station, BESS, and associated access roads. Tree clearing for the TL upgrades would be limited to removal of small trees and tree limbs along existing access roads.

Following construction, disturbed portions within the fenced-in area of the solar facility would be seeded with native grasses and/or noninvasive vegetation, including plants that tend to attract pollinators. Vegetation on developed portions of the Project site would be maintained to control growth through occasional mowing but primarily by grazing sheep. The sheep would graze the vegetation and be moved between fenced paddocks to maintain appropriate vegetation height. The sheep would help maximize plant and animal diversity on the Project site. The sheep would disperse seeds, both from their coats and through their manure, and their movement around the site would establish new plant growth and greater diversity in species composition. Routine management of vegetation within non-agricultural portions of the TL upgrade areas would be conducted under an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species.

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 the area with noninvasive plant species. Construction of the Project would likely 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 of exotic or invasive species.

Planned tree removal associated with the Project has been minimized to the extent possible in the design process. Approximately 93 acres of forested land, about half of the existing forested land on the Project site, would be cleared for the Project. Except for the impacted portion of the jurisdictional waters as described in Section 3.3.2., Project components would not be constructed within a 50-foot buffer of wetlands and intermittent streams and within a 100-foot buffer of sinkhole fissures/karst features, and the buffered areas would generally be avoided during construction, as described in Section 2.2.2.

Taking into consideration the total of about 38,500 acres of forested land in Logan County, clearing the existing vegetation, including 93 acres or approximately 50 percent of existing forest on the Project Site, and light grading would be considered minor impacts. Approximately 1,394 acres (89 percent) of the 1,569-acre Project site are agricultural fields, pastures, or otherwise cleared, open land, while approximately 188 acres (11 percent) of the Project site are forested. The loss of 93 acres of forested land would amount to approximately 0.24 percent of overall forested land countywide. The surrounding area consists of similar vegetation communities of mostly agricultural land and some forested areas; therefore, the effects of the conversion of portions of the Project site in this context would be relatively minor.

3.4.2.2.3 Wildlife

The construction and operation of the solar facility would impact the wildlife on the Project site through the removal of about 93 acres of forest and conversion of most of the site to a mix of grasses and herbaceous plants, including those that tend to attract pollinators, growing under and around the solar arrays. The forest that would be removed generally occurs in small patches within the agricultural landscape and in linear patches along field borders or streams and consists of mixed deciduous forests. Several nonnative invasive plant species were observed in the forested areas, particularly in the bottomland areas of the Project site adjacent to the larger stream channels. Although these areas may be in small patches or linear, they represent areas of refuge or corridors for movement for forest-dependent wildlife. The removal of forested habitat from the site would have direct and indirect adverse effects on the wildlife species that utilize this habitat. This would result in the temporary to long-term displacement of wildlife (primarily common native or naturalized species) using the area. Less mobile species would likely be eliminated, as would species that are unable to find nearby suitable habitats. The Project site would allow for movement through the area, as the Project fences would not surround the entire site and, thus, would allow wildlife movement between the fences. Overall, the proposed action would have minor adverse impacts on populations of common wildlife species. These impacts would be partially offset by minor beneficial effects from the Project sheep grazing operation. Vegetation management of the site, intended to provide fodder for the sheep, would help maximize animal diversity on the Project site by creating pollinator habitat and encouraging ground-nesting bird habitat by allowing seed heads to reach maturity wherever possible.

3.4.2.2.3.1 Migratory Birds

Thirteen of the 23 birds of conservation concern are likely to occur on the Project site based on suitable habitat. The clearing of forest would eliminate potential habitat for the wood thrush, Kentucky warbler, eastern whip-poor-will, chimney's swift, and red-headed woodpecker as well as other more common migratory birds inhabiting forests. The removal of wooded and brushy fencerows and scattered large trees would eliminate potential habitat for the Bewick's wren, prairie warbler, and field sparrow. Areas of the TL ROWs that are not maintained as grassland or cropland would provide habitat for the prairie warbler and, when adjoining woodland, particularly near the end of their vegetation management cycles when shrubs and tree saplings would be most prevalent. The Project would establish 50-foot avoidance buffers surrounding wetlands and intermittent streams and would maintain the existing riparian vegetation for the most part. Therefore, the Project effects to wetlands and riparian vegetation would result in a negligible to minor impact to populations of migratory birds.

Although construction and operation of the Project may reduce the foraging potential on the Project site and in the TL upgrade areas, the Project is not anticipated to have an effect on populations of migratory birds that require open country with scattered trees and shrubs, such as the prairie warbler. Similar habitat type is available adjacent to the Project site, including approximately 38,493 acres for forested lands across the county, and would likely absorb displaced individuals.

With the maintenance of 50-foot buffers surrounding wetlands and intermittent streams, 100-foot buffers surrounding sinkhole fissures/karst features, and approximately 50 percent of the existing forest areas, the Project would minimize impacts on mature, deep, and shady bottomland forest, which provides habitat for species such as the wood thrush and Kentucky warbler. Therefore, the Project would have minor adverse effects on these species. Any effects would be limited in scale relative to the surrounding available habitat.

Overall, while the implementation of the Project would reduce habitat for some migratory bird species, particularly those occupying woodlands, the effect on migratory birds will be localized and minor.

Bald eagles are unlikely to nest or forage on the Project site due its distance from large waterbodies. In addition, no bald eagle nests have been documented within three miles of the Project site. Therefore, the Project is not anticipated to have an impact on bald eagles. 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.

3.4.2.2.4 Rare, Threatened and Endangered Species

Suitable habitat exists for the federally listed northern long-eared bat, Indiana bat, and gray bat and for the state-listed mud crayfish, mammoth cave crayfish, loggerhead shrike, Bachman's sparrow, and the common barn owl. Forested areas, five sinkhole fissures/karst features, and 12 buildings on the Project site provide potential bat roosting and/or foraging habitat for federally listed bat species. However, no listed bat species were caught during an onsite mist net survey conducted in late May through early June. In compliance with Section 7 of the ESA, TVA is

consulting with USFWS on the potential effects of the Proposed Action on federally listed bat species (Appendix C). Ninety-three acres of trees and shrubby vegetation, representing 50 percent of the forested areas on the Project site, and all 12 buildings have the potential to be removed for the Project. The Project would avoid impacts to the five identified sinkhole fissures/karst features by maintenance of minimum 100-foot buffers.

Impacts to potential habitat for the mud crayfish and mammoth cave crayfish would be avoided since there are no road crossings over the stream channels that may provide subterranean stream habitat for these crayfish species. Therefore, the Project would be unlikely to impact these species.

Three state-listed bird species are likely to occur on the Project site based on suitable habitat. Although the implementation of the Project will reduce habitat for some species, particularly those occupying woodlands, the effect on bird species will be localized and minor.

Impacts to the population of the cypress-knee sedge would be avoided by the maintenance of a buffer area around its sinkhole swamp habitat. Six of the 11 occurrences of the small flower baby blue eyes would be impacted by tree clearing. The other five occurrences, including the largest and most vigorous occurrence in a mature beech/maple forest in the northeast portion of the Project Site, would not be affected. While this weedy species would be adversely affected, the impacts would not be significant at the regional or state level. Its discovery in the Project area represents a major increase in the range and number of occurrences in Kentucky, and the loss of some of these newly discovered occurrences would not affect its viability in the state or the vicinity of the Project area.

Overall, implementation of the Proposed Action is not likely to adversely affect federally listed species, including the three federally listed bat species that have potential in the Project area, and would result in minor and insignificant impacts to state-listed species.

3.4.2.3 Cumulative Impacts

RFFAs may occur at multiple locations near the Project site, and these other projects would affect vegetation and wildlife habitat. However, given that agriculture is the dominant land use in the areas suited for development, future development would likely not result in significant impacts to important terrestrial habitats. While RFFAs in the surrounding region will likely remove available habitats for wildlife in the foreseeable future, the impacts of the Project would not result in significant cumulative impacts to vegetation and wildlife due to the relatively small area of forest to be removed (93 acres; 0.24 percent of forested land within Logan County) and maintenance of the site as grassland/pasture that would encourage pollinator and ground-nesting bird habitat. The Project is not expected to result in significant cumulative impacts to threatened and endangered terrestrial wildlife and plant species, as the Project is not likely to adversely affect federally listed species and would result in minimal impacts to state-listed species.

There are several RFFAs in the Project area that include the use of undeveloped lands to support industrial or other intensive developments. These projects and their associated direct

and indirect impacts would likely gradually degrade existing streams and threatened and endangered aquatic species within the Project area over the next several decades. Negative Project impacts resulting from cumulative impacts may be lessened by the proposed mitigation measures outlined in Section 2.5. Cumulatively, the Project would contribute to the long-term conversion of agricultural and disturbed lands to industrial uses. However, this cumulative impact would not be significant because of the marginal value of these lands for species and habitat protection.

3.5 Visual Resources

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 (after TVA 2016; USDA 1995). 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 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.

The Project site is in a rural agricultural area with isolated single-family homes and agricultural buildings scattered across the site. A few small rural-residential concentrations and businesses adjacent to highways are present in the Project area. The Project site is predominantly flat to gently sloping agricultural land with scattered forested areas and some wetlands, streams, ponds, and karst features. Scenic attractiveness of the general Project area viewshed is rated as typical or common of a rural agricultural and rural residential area. Scenic integrity is assessed as moderate to high due to the relative unity of the surrounding natural and cultural character. Photo 3-1 and Photo 3-2 show general views of the Project site.



Photo 3-1. Agricultural land and wooded field border on the Project site



Photo 3-2. Forested area on the Project site

Visual receptors surrounding the Project site include small rural-residential concentrations along Watermelon Road, US 79, Joe Montgomery Road, and Green Downs Road; isolated single-family homes along A.P. Miller Road, Marian Acres Road, and Kees Road; four businesses, two along Watermelon Road two along US 79; a church along US 79; and the RJ Corman Railroad (Table 3-12; Figure 3-9).

Table 3-12. Visual receptors in the vicinity of the Project site

Receptor Location	Description	Receptor Type	Views to Project Site
Watermelon Road	Two-lane paved public road that extends north-south along the western boundary of the Project site.	Rural residential concentration Businesses Road travelers	Partially obscured by mature deciduous trees
A.P. Miller Road	Two-lane gravel road that traverses east-west through western and central portions of the Project site. Provides access to the Project site through its connection with Watermelon Road.	Isolated single-family home	Unobstructed

Receptor Location	Description	Receptor Type	Views to Project Site
Joe Montgomery Road	Two-lane road with paved and gravel portions that traverses north-south through eastern portions of the Project site. Provides access to the Project site through its connection with US 79.	Rural residential concentration Road travelers	Partially obscured by mature trees
US 79	Two-lane undivided federal highway that extends northeast-southwest, approximately a quarter mile from the northwestern terminus of the Project site.	Rural residential concentration Businesses Church Road travelers	Partially obscured by mature deciduous trees
Marian Acres Road	Two-lane road that extends east-west near the northeastern portion of the Project site that connects to Joe Montgomery Road.	Isolated single-family homes	Partially obscured by mature deciduous trees
Green Downs Road	Two-lane road that extends northwest-southeast near the southeastern portion of the Project site.	Isolated single-family homes	Unobstructed
Kees Road	Two-lane road that extends northwest-southeast near the southeastern portion of the Project site.	Isolated single-family home	Partially obscured by mature deciduous trees
RJ Corman Railroad	Short line railroad that extends north-south adjacent to the western boundary of the Project site.	Train personnel	Unobstructed

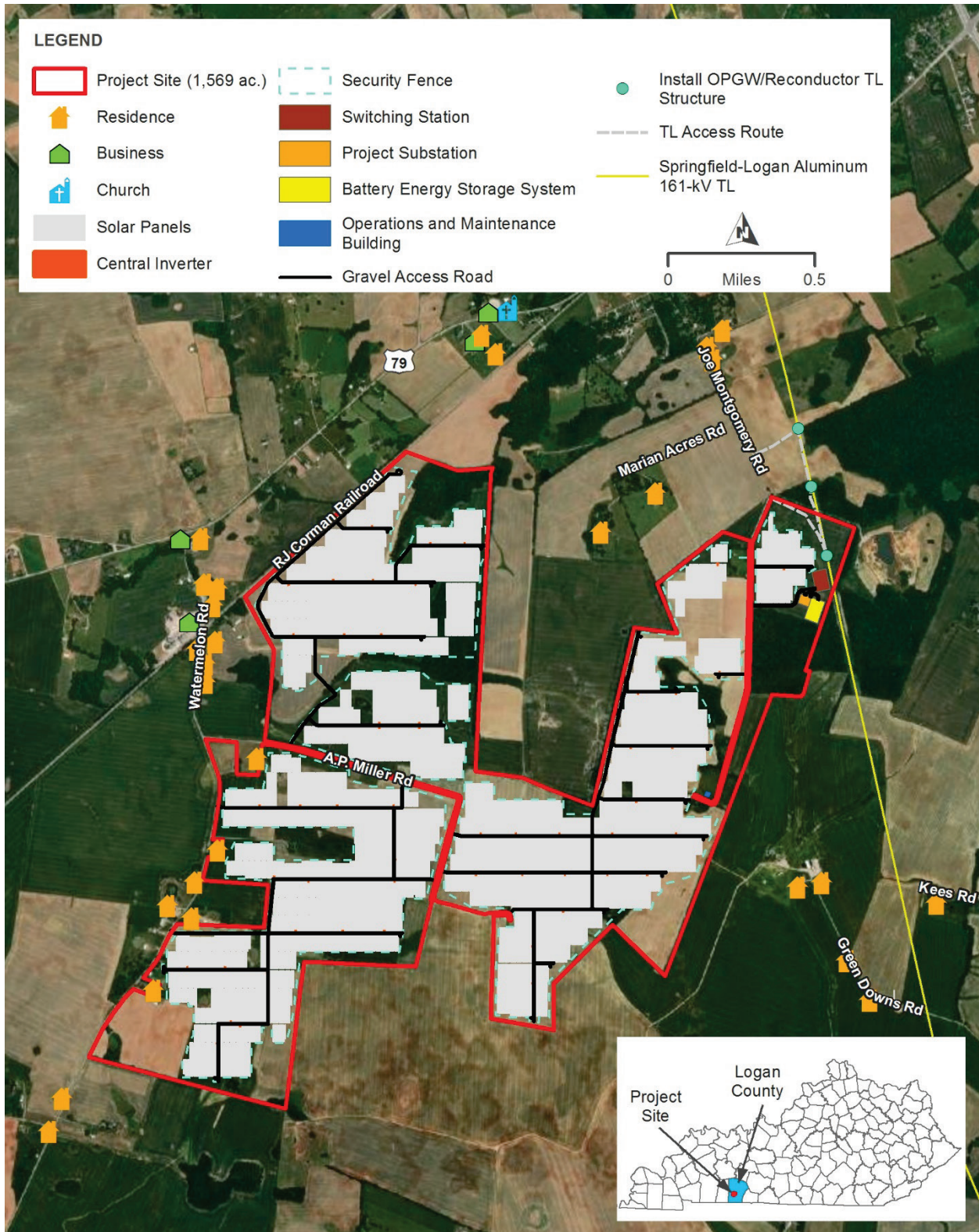


Figure 3-9. Visual receptors in the vicinity of the Project site

Long-range views from visual receptors near the Project site, primarily along or off of Watermelon Road, Joe Montgomery Road, US 79, Marian Acres Road, and Kees Road, are

generally partially obscured by mature deciduous trees, as well as those framing fields and/or roads nearby. However, some portions of Watermelon Road have relatively unobstructed views to the Project site (Photo 3-5). Long-range views from visual resources near the Project site along A.P. Miller Road, Green Downs Road, and RJ Corman Railroad are relatively unobstructed (Photo 3-6).



Photo 3-3. View to Project site looking east from 1209 Watermelon Road



Photo 3-4. View to Project site looking east along AP Miller Road, about 100 yards east of Watermelon Road

3.5.2 Environmental Consequences

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 remain relatively unchanged from the predominant mix of agricultural and forested land. However, if the Project site were to be developed by other parties and the city of Russellville were to expand southward, impacts to visual resources in the Project area would be likely. Visual changes may occur over time as vegetation on the Project site changes. For example, if the Project site were no longer cultivated or mowed, vegetation would change from low-profile plants to shrubs and trees.

3.5.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, Russellville Solar would construct and operate a 173-MW AC single-axis tracking PV solar power facility. Visual concerns are often associated with both large- and small-scale solar facilities and their electrical infrastructure. The Project site is predominantly flat to gently sloping terrain, and the Project would convert what is currently agricultural and forested lands to an industrial use mostly consisting of low-profile PV arrays. Figure 3-9 shows the proposed Project elements and the locations of nearby vantage points (receptors) from which Project elements may be visible. Photo 3-5 and Photo 3-6 show representative views of the type of solar panels proposed for the Project. In the evening, when panels would be facing west, the more pronounced visual effects would largely occur from vantage points to the west of the Project site, along Watermelon Road, A.P. Miller Road, Joe Montgomery Road, US 79, Marian Acres Road, and RJ Corman Railroad.



Photo 3-5. Single-axis, tracking photovoltaic system with panels near maximum tilt as viewed from the east or west



Photo 3-6. The backside of the solar panels in early morning or late afternoon configuration

Construction activities would temporarily alter the visual character of the Project area. During construction, heavy machinery would be present, changing the appearance from area vantage points. Within the 1,086-acre area to be developed for the Project, trees and other tall vegetation would be removed, and portions of the area would be graded, changing the contour, color, and texture of the scenery attributes. During and after grading, 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, as most construction is anticipated to occur during the day. Overall, there would be minor direct and indirect impacts to visual resources in the Project area during the construction phase of the Proposed Action. However, these impacts would be temporary, lasting approximately 14 to 18 months, subject to weather.

If left unbuffered, the manufactured, structured appearance of the built facility would be most apparent from vantage points surrounding the Project site along Watermelon Road, A.P Miller Road, Marian Acres Road, Green Downs Road, and RJ Corman Railroad (Photos 3-7, 3-8). However, in following county requirements for solar facilities, the Project would include vegetative buffer composed of a double row of eight-foot-high trees would be planted in a staggered pattern around the perimeter of the site approximately 10 feet from the Project site boundaries, where existing natural buffers are not sufficient in shielding views of the facility (Photos 3-9 and 3-10). A screen would be added to the security fence for additional visual buffering. Both the vegetative buffer and screen can be waived by landowners having at least

1,000 continuous feet of property adjacent to the project site, as approved by the Logan County Fiscal Court. The Project would also adhere to county-required setbacks of Project components of 100 feet from adjacent property boundary lines and public road and railroad ROWs and 250 feet from residences, schools, churches, hospitals, nursing facilities, and cemeteries (Logan County 2022). By following these county requirements, views to the Project site from surrounding receptors would be minimized.

Where the screening plan is waived by affected landowners or topography reduces the efficacy of the buffer and depending on the direction of views to the Project site, the Project would be more visually intrusive in the morning and late afternoon, when the panels would be facing east or west, respectively, at their maximum tilt, with the upper edge of the panels about eight feet from the ground. This effect would be least at mid-day, when the panel profile would be flat and about five feet tall. The anti-reflective PV panel surfaces would minimize glare and reflection. Lighting associated with the Project would be downward-facing and/or low glare to minimize impacts to surrounding areas.

The visual alteration from agricultural and forested land in an area where scenic integrity is rated as moderate to high due to the relative unity of the surrounding natural and cultural character to a large solar facility is expected to result in minor adverse visual impacts. Overall, the visual effects of the built facility are expected to be negligible to minor due to the visibility of relatively small portions of the Project elements due to Project adherence to the planting of vegetative buffers and fence screen. Visual effects from the Project would be minimal on a larger scale, due to variation of the visual attributes of the Project area as distance from the Project increases.



Photo 3-7. Unbuffered view of simulated PV arrays looking east from 1209 Watermelon Road.



Photo 3-8. Unbuffered view of simulated PV arrays looking east along AP Miller Road, about 100 yards east of Watermelon Road. The PV arrays are in the background to the left (north) of the road.



Photo 3-9. Buffered view of simulated PV arrays looking east from 1209 Watermelon Road.



Photo 3-10. Buffered view of simulated PV arrays looking east along AP Miller Road, about 100 yards east of Watermelon Road.

TVA would perform network upgrades to approximately 2,500 feet of its existing Springfield-Logan Aluminum 161-kV TL. If used, a helicopter would be visible to several residences and travelers along Joe Montgomery Road, Marian Acres Road, and US 79 during the installation of OPGW for approximately two days. Other equipment associated with the TL upgrades may also be visible for the two-day duration. Overall, the TL upgrade work would likely result in temporary, minimal to minor impacts to the visual receptors near the northeast portion of the Project site.

3.5.2.3 Cumulative Impacts

The Proposed Action would alter the visual character of the Project site by converting a large area of agricultural and forested land to numerous low-profile parallel rows of PV panels, an electrical substation, switching station, and a BESS. Much of the developed Project site would be screened from nearby public roads and residences. Visual impacts from other locations around the site perimeter would be low to moderate and mostly at middle-ground distances. The potential industrial development of the RFFAs in the Project area could result in greater visual impacts due to the size of the buildings and supporting infrastructure. Because the visual impacts of the Proposed Action would be comparatively low, localized, and minimized, the Proposed Action has little potential to result in adverse cumulative visual impacts.

3.6 Noise

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). The human ear does not perceive all sound frequencies equally well. Therefore, measured sound levels are adjusted or weighted to correspond more closely to noise perceived by human hearing. The adjusted noise metric that most closely duplicates human perception of noise is known as the A-weighted decibel (dBA). The threshold of human hearing is 0 decibels (dB), and the threshold of discomfort or pain is around 120 dB.

A day-night average sound level (L_{dn}) is a 24-hour noise descriptor used to assess noise impacts for land uses where people sleep and there is a heightened sensitivity to nighttime noise. The L_{dn} noise metric is recommended by USEPA and has been adopted by most federal agencies (USEPA 1974). An L_{dn} of 65 dBA is the threshold level most commonly used for noise planning purposes, representing compromise between community impact and the need for activities such as construction. The dBA is the adjusted noise metric that most closely duplicates the human perception of noise. Areas exposed to an L_{dn} above 65 dBA are generally not considered suitable for residential use. An L_{dn} 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 3-13.

Table 3-13. 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 3 feet	70
Noisy urban area, daytime	75
Food blender at 3 feet	90
Gas lawn mower at 3 feet	100
Jet flyover at 1,000 feet	110

Source: Caltrans 2018

The Project site is primarily agricultural and rural-residential, with scattered forest, wetlands, streams, and ponds. Ambient noise at the Project site 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 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 113 noise-sensitive receptors are within the area examined (Figure 3-10). These primarily consist of residences, residential farm complexes, associated outbuildings, and nonresidential agricultural complexes, with each building generally counted as one receptor. Agricultural outbuildings and rural-residential concentrations of noise-sensitive receptors occur around the perimeter of the Project site, ranging from less than 250 feet to approximately 2,640 feet from proposed PV array locations. Residential concentrations are primarily located near the western portion of the Project site, while a few residences and associated outbuildings are scattered along the eastern and northern boundaries of the Project site.

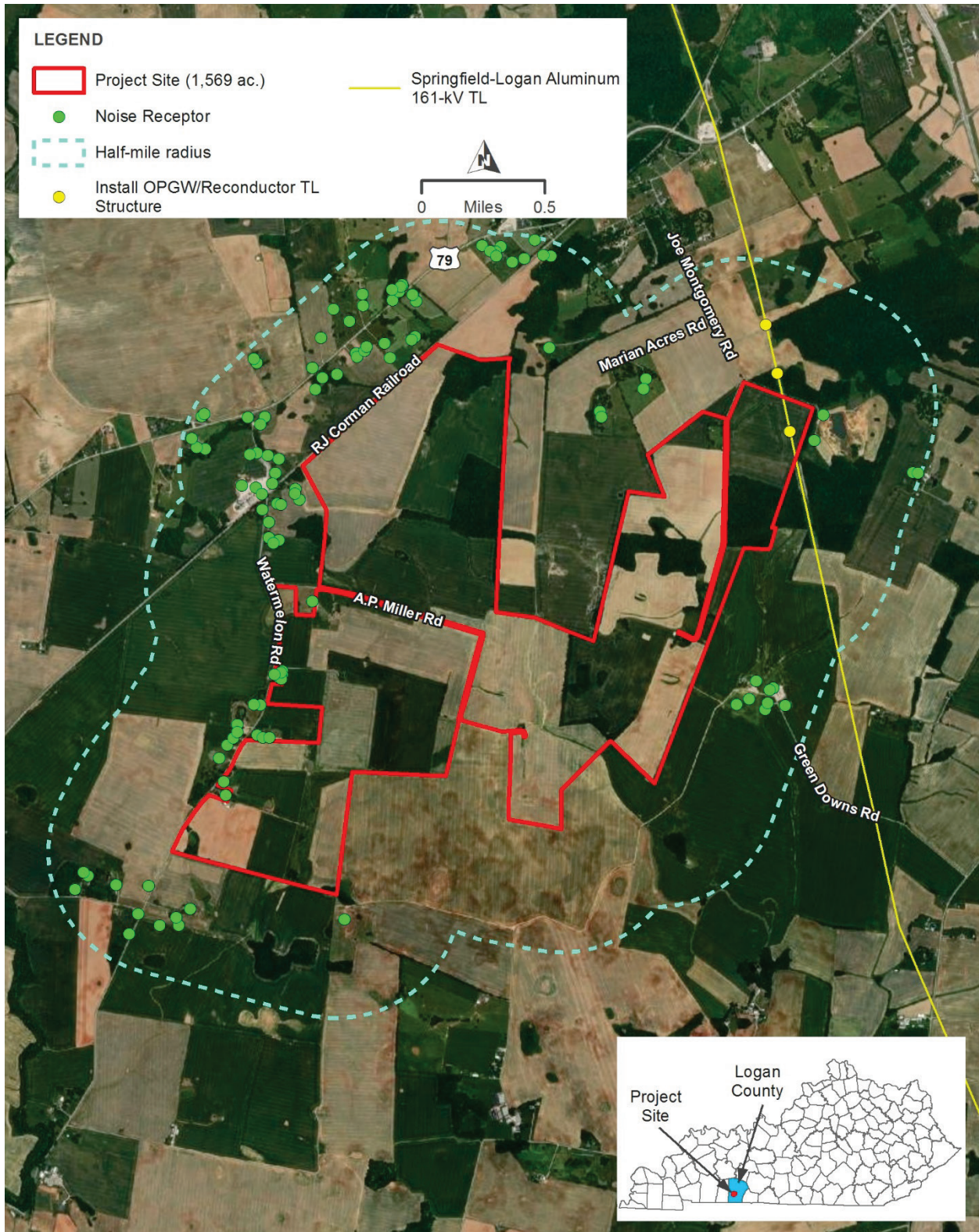


Figure 3-10. Noise-sensitive receptors in the Project area

3.6.2 Environmental Consequences

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 remain a mix of agricultural and rural-residential and undeveloped, forested land; therefore, the ambient sound environment would be expected to remain as it is at present. However, if the Project site were to be developed by other parties and the city of Russellville were to expand southward, impacts to noise receptors in the Project area would be likely.

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. 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 would be used for approximately 14 to 18 months at the Project site.

Construction noise would cause temporary and minor adverse impacts to the ambient sound environment in the Project area. Several residences and residential and nonresidential agricultural complexes would experience heightened noise during construction, primarily from pile-driving activities. However, when agricultural activities are more active in the fall and early winter, ambient sounds in the Project area are often higher than the typical 45 to 55 dBA in the Project area, and these existing noises would help offset effects from the Project. 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 period would be pile driving during the construction of the array foundations, which would be completed in approximately six months. Standard construction pile drivers are estimated to produce between 90 to 95 dBA at a distance of 50 feet (USDOT 2015). The piles supporting solar panels are anticipated to be driven into on-site soils and potentially into limestone, depending on the depths of piles and on 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 OSHA regulations. Noise-sensitive receptors near the TL upgrade areas would temporarily experience heightened noise primarily during the approximately two-day installation of OPGW by helicopter.

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. Within 50 feet of US 79, traffic sounds may reach 70 to 80 dBA during high traffic periods (Corbisier 2003). Since construction would only occur during the day for most of the construction period, when other ambient sounds in the Project area would also occur, the noise effects from Project construction would be minor apart

from pile-driving activities during construction. Pile-driving activities would result in temporary, moderate noise effects.

Following completion of construction activities, the ambient sound environment would return to existing levels or below, by eliminating the seasonal use of some 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 each emit approximately 50 dBA at 300 feet. The cooling units used in the Project BESS would emit noise levels of approximately 65 dBA at 10 feet (AKRF 2019). As no noise receptors are within 10 feet of the BESS, 33 feet of the proposed inverter locations, or 300 feet of the Project substation, noise impacts from these Project components are anticipated to be minimal to negligible. Thus, noise impacts from the Project are not anticipated. Due to sheep operations on the Project site during the operations and maintenance phase and minimal mowing or use of farm equipment, the Proposed Action would have similar to lower noise levels than are typical on the Project site currently with row crop operations.

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 negligible to minimal impacts during operation and maintenance of the solar facility.

3.6.2.3 Cumulative Impacts

Past, present, and RFFAs are expected to result in noise impacts in the Project area. Two of the four bridges involved in the US 79 Bridge Replacement project are located within four miles from the Proposed Action, and the bridge replacement may coincide timewise with the Proposed Action. However, timing would not coincide with the US 79 widening project. Therefore, it is anticipated that activities associated with the Proposed Action and US 79 Bridge Replacement could contribute to cumulative impacts to noise receptors during the construction period. This would result in minor, short-term noise impacts. While the Proposed Action has the potential to contribute to cumulative impacts on noise, these impacts would be minor and short term.

3.7 Air Quality and Greenhouse Gas Emissions

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 (SO₂), ozone (O₃), nitrogen dioxide, particulate matter whose particles are less than or equal to 10 micrometers (PM₁₀), particulate matter whose particles are less than or equal to 2.5 micrometers (PM_{2.5}), carbon monoxide (CO), and lead (Pb).

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect public welfare (e.g., visibility, crops, forests, soils, and materials)

from any known or anticipated adverse effects of air pollutants. Areas in compliance with the NAAQS are designated “attainment” areas. Areas in violation of the NAAQS are designated as “nonattainment” areas, and new sources being located in or near these areas may be subject to more stringent air permitting requirements. Nonattainment areas are usually defined by county. 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 a 20-year maintenance period, the status reverts back to normal attainment.

3.7.1.1 Regional Air Quality

The Project site is within a rural agricultural area of Logan County, Kentucky, approximately two miles southwest of the city of Russellville. Several residences and agricultural buildings are scattered across the Project site. Logan County has no active air quality monitoring sites listed in USEPA’s national database for NAAQS-regulated pollutants and is considered to be in attainment for all NAAQS. There are active monitoring sites for some pollutants (SO₂ and PM_{2.5}) in the Clarksville Metropolitan area, which is comprised of Christian and Trigg counties in Kentucky and Stewart and Montgomery counties in Tennessee. The Clarksville Metropolitan area is designated as in attainment for all NAAQS.

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 Russellville, approximately two miles northeast of the Project area, the coldest month is January, with average maximum and minimum temperatures of approximately 44 degrees Fahrenheit (°F) and 26°F, respectively. The warmest month is July, with average maximum and minimum temperatures of approximately 89°F and 67°F, respectively. Precipitation is highest in May, and averages approximately 51 inches per year (NOAA 2021a). On average, approximately 21 tornados occur in Kentucky each year (NOAA 2021b).

3.7.1.3 Greenhouse Gas Emissions

According to USEPA, greenhouse gases are those gases that trap heat in the atmosphere (USEPA 2022b). These consist of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases. GHG emissions include natural and man-made compounds that disperse throughout the earth’s atmosphere. GHGs act as insulation and contribute to the maintenance of global temperatures. As the levels of GHG emissions in the atmosphere increase, the result is an increase in temperature on earth, commonly known as global warming.

Apart from water vapor, the primary GHG emitted by human activities in the U.S. is carbon dioxide (CO₂), representing approximately 82 percent of total GHG emissions in the U.S. The largest source of CO₂ and of overall GHG emissions is fossil fuel combustion (USEPA 2021). GHG emissions from the TVA power system are described in the IRP (TVA 2019).

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed. Therefore, no Project-related impacts 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. However, development by other parties could occur on the Project site in the absence of the Project. 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 result from the construction and operation of the Project. Temporary impacts to GHG emissions expected during construction would be negligible. The Proposed Action would have longer term, minor beneficial impacts to air quality by increasing the capacity of non-emitting generating facilities providing power to the TVA system and offset the need for fossil-fuel power generation and its associated emissions rates.

3.7.2.2.1 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 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. Burning debris would generate temporary localized air quality impacts due to smoke particles and gases. Any such burning would be done in accordance with local ordinances or burn permits and is not expected to have any health consequences for this sparsely populated rural area.

Combustion of gasoline and diesel fuels by internal combustion engines (haul trucks and off-road vehicles) would generate local emissions of PM, NO_x, CO, volatile organic compounds, and SO₂. The total amount of these emissions would be small and, overall, would result in negligible air quality impacts.

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.

3.7.2.2.2 Regional Climate

No noticeable direct or indirect impacts to the local or regional climate would be associated with the construction and operation 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 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, as 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

3.7.2.2.3 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 and combustion of jet fuel by a helicopter along the existing TL during the installation of OPGW would generate emissions of CO₂ and very small amounts of other GHG emissions such as methane and nitrous oxide. Additional GHG emissions would result from transporting materials and workers to the Project location, and elsewhere in the U.S. or globally from production and transportation of the facility components. The production of facility components 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 would offset the need for some fossil-fuel-based electricity generation and its associated GHG emissions.

Tree and other tall vegetation removal during construction of the Project would represent a minor loss of potential carbon sequestration, especially given that the vast majority of the Project area is currently fields and open land. Trees and other tall vegetation currently remove CO₂ 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 any deforestation. The loss of the carbon sink from tree removal would be at least partially offset by the increased sequestration of CO₂ by the permanent grass-dominated vegetation that would be maintained on the solar facility 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 operations as the nearly emissions-free power generated by the solar facility would offset the need for 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 on regional or larger scales. It would, however, be a component of the larger ongoing system-wide reduction in GHG emissions from the TVA power system through reducing the need for some fossil-fuel-based electricity generation. The adverse impacts of GHG emissions are described in the U.S. Global Change Research Program’s Fourth National Climate Assessment (USGCRP 2018), and the

beneficial impacts of TVA's reduction in GHG emissions are described in the TVA IRP (TVA 2019).

3.7.2.3 Cumulative Impacts

The construction of the Proposed Action could potentially coincide with the US 79 Bridge Replacement project which could contribute to cumulative impacts to air quality and increase GHG emissions. However, impacts during construction would be short term and would be mitigated using construction BMPs, including wet suppression to reduce fugitive dust. During construction, coordination with the US 79 Bridge Replacement project could occur to minimize emissions from construction vehicles and commuter motor vehicles. The potential development of the West Industrial Park and Camp Property could also contribute to cumulative impacts depending on the timing of those projects. Overall, with implementation of minimization and mitigation measures, the Project is not expected to contribute to cumulative impacts to air quality and increase GHG emissions.

3.8 Cultural Resources

3.8.1 Affected Environment

Cultural resources are properties and places that illustrate aspects of Precontact or historic times 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 NHPA, as amended (54 U.S.C. § 300101 et seq.), addresses the effects of federal and/or federally funded projects on tangible cultural resources—that is, physically concrete properties—of historic value. The NHPA provides 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.

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. "Undertaking" includes any project, activity, or program that has the potential to affect 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.

Evaluating an undertaking's 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 initiation, identification, assessment of adverse effects, and resolution of any adverse effects. 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 would diminish any of the qualities that make

the property eligible for the NRHP (based on the criteria for evaluation at 36 CFR § 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 historic building's integrity of feeling or setting and its ability to convey its historic and/or architectural significance. 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 review 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. 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.

3.8.1.1 Identification Survey and Field Findings Summary

As part of the evaluation process, a Phase I cultural resources survey was conducted by New South Associates (New South) on the Project area from May 25 to July 7, 2021 to determine the presence of archaeological and architectural cultural resources (Gregory et al. 2021; Schoof et al. 2022; Appendix C). The Project area examined for archaeological resources, referred to herein as the Area of Potential Effect (APE), encompassed the 1,585-acre Project site. Approximately 709 acres of the Project area were previously surveyed by AECOM for archaeological sites but not reported on by AECOM due to cessation of the work by the related client. The Project area examined for historic-age architectural resources, referred to herein as the Viewshed, included the 1,585-acre APE and the portions of a 0.5-mile radius surrounding the APE that are visually connected by direct line-of-sight (Figure 3-11).

Cultural resources identification consisted of background research and architectural and archaeological field surveys; the associated reports provide preliminary NRHP evaluations and a results summary. During their 2019 and 2020 survey efforts, AECOM investigated 2,858 shovel test locations within the Project area. Of those, 366 contained cultural material, and 2,492 were negative. New South investigated an additional 7,124 shovel test locations. Of those, 5,619 were placed at regular 20-meter intervals, and 769 were delineation shovel tests. New South investigated the remaining 736 shovel tests to delineate positive shovel tests excavated by AECOM. New South identified or newly reported on a total of 97 archaeological sites, 66 isolated finds, and three historic cemeteries. Of the 97 sites, 89 lack integrity, significance, or both. As a result, New South recommends these 89 sites not eligible to the

NRHP under any of the four criteria for eligibility. No further investigation is recommended for these 89 sites. New South recommends the three cemeteries (BC17 (Anderson Cemetery), Cemetery 2 (Ogden Gravesite), and Cemetery 5 (Miller Cemetery)) not eligible to the NRHP under any of the four criteria for eligibility. The remaining eight sites (15LO297, 15LO332, 15LO357, 15LO358, 15LO367, 15LO405, 15LO410 and 15LO412) are recommended as having unknown NRHP eligibility.

During the architectural survey, New South documented 26 historic-age architectural resources within the APE or Viewshed. Three of these resources were previously surveyed. One of the architectural resources is eligible for listing in the NRHP.

Cultural resources identification consisted of background research and architectural and archaeological field surveys; the associated reports provide preliminary NRHP evaluations, a results summary, and the Precontact and historic context of the Project area (Gregory et al. 2021; Schoof et al. 2022).

3.8.1.2 Known Cultural Resources

On April 21, 2021, New South requested data from the site files and the GIS database maintained by the Kentucky Archaeological Site Files, the Kentucky Office of State Archaeology (OSA), and the Kentucky Heritage Council (KHC), to identify previously cultural recorded resources within one mile of the Project, herein referred to as the research radius. Available historical maps were also geo-referenced and reviewed to determine the location of potential historic resources within the research radius. The data from KHC was received on April 26, 2021, and the data from the OSA was received on May 11, 2021.

The KHC and OSA records indicated 10 previously recorded archaeological sites and three historic resources within a one-mile radius of the Project area (Table 3-14).

Table 3-14. Archaeological and Historic Resources within One Mile of the Project

Resource Number	Temporal Association	Type	NRHP Recommendation
Archaeological Sites			
15LO182	Undetermined Precontact/1851-1950	Open habitation without mounds	Not Evaluated
15LO181	Undetermined Precontact/1851-1950	Open habitation without mounds	Not Evaluated
15LO194	1801-1900	Cemetery	Not Evaluated
15LO230	Undetermined Precontact/1851-1900	Open habitation without mounds	Not Eligible
15LO231	Undetermined Precontact/1851-1950	Open habitation without mounds	Not Eligible
15LO232	Undetermined Precontact	Open habitation without mounds	Not Eligible
15LO233	1851-1900	Cemetery	Not Evaluated
15LO234	Undetermined Precontact/1901-1950	Open habitation without mounds	Not Eligible
15LO235	Undetermined Precontact/1801-1950	Historic farm/residence	Not Eligible
15LO236	Undetermined Precontact/1851-1950	Open habitation without mounds	Not Eligible
Historic Resources			
LO95	1825-1849	Historic farm/residence	Eligible
LO96	1825-1849	Historic farm/residence	Not Eligible
LO245	1800-1824	Historic farm/residence	Not Eligible; Brown House is a Kentucky Landmark

During the archaeological survey, the entire APE was assessed via pedestrian walk-over and shovel testing. The archaeological survey included the re-examination of approximately 709 acres conducted by AECOM in 2019 and 2020. A total of 97 archaeological sites, 66 isolated finds, and three historic cemeteries were recorded within the APE (Table 3-15). By definition, isolated finds retain neither integrity or Precontact nor historic significance. New South,

therefore, recommends that all 66 isolated finds are not eligible for listing in the NRHP under any of the four criteria.

Of the 97 archaeological sites, 68 are Precontact, seven are historic, and 22 contain both Precontact and historic components. Several sites also contained Precontact or historic isolated finds that were not assigned as components. Of the 90 sites with Precontact components, site types included 89 temporary campsites/lithic scatters and one lithic workshop. Site types among the 29 sites with historic components included three cemeteries, 25 artifact scatters, one well, and one building foundation.

Based on the survey findings, TVA determined that 89 of the archaeological sites are not eligible or are not contributing resources for the NRHP, and no further work is recommended at these sites prior to implementation of the Project. TVA finds eight sites, listed in Table 3-15, as having unknown NRHP eligibility. TVA recommends that these eight sites be avoided or have additional testing to evaluate their NRHP eligibility. TVA is consulting with KHC and federally recognized Indian tribes with an interest in the region on these determinations.

Table 3-15. Archaeological Sites with Unknown NRHP Eligibility Within the APE

State Site #	Field Site #	Site Type	Temporal Affiliation	NRHP Recommendation	Management Recommendation
15LO297	BC02	Multi-Component Scatter	Undetermined Precontact; Eighteenth-Twentieth Century	Unknown	Avoidance or Additional Testing
15LO332	BC06	Multi-Component Scatter	Undetermined Precontact; Nineteenth-Twentieth Century	Unknown	Avoidance or Additional Testing
15LO357	KAF04	Multi-Component Scatter	Undetermined Precontact; Nineteenth-Twentieth Century	Unknown	Avoidance or Additional Testing
15LO358	KAF05	Temporary Campsite	Undetermined Precontact	Unknown	Avoidance or Additional Testing
15LO367	LEP01	Multi-Component Scatter	Late Archaic/Early Woodland; Nineteenth-Twentieth Century	Unknown	Avoidance or Additional Testing
15LO405	RS43	Temporary Campsite	Undetermined Precontact	Unknown	Avoidance or Additional Testing
15LO410	BC13	Lithic Workshop	Middle-Late Archaic Period	Unknown	Avoidance or Additional Testing
15LO412	JAN01	Temporary Campsite	Late Archaic-Early Woodland	Unknown	Avoidance or Additional Testing

The historic architecture survey resulted in fieldwork documentation of 26 individual resources, three of which (LO95, LO96, and LO245) were previously surveyed. The 26 resources include 12 dwellings, 10 farmsteads, two cemeteries, a roadside restaurant, a highway corridor, and a railroad corridor (Table 3-16).

Two resources (LO 245 and LO 325) are located entirely within the APE. Resource LO 245, the Brown Farm and Anderson Cemetery, is not eligible for the NRHP, though the Brown house is a Kentucky Landmark, indicating that KHC considers the property as worthy of preservation. The Brown Farm and Anderson Cemetery consists of an 82-acre parcel containing the house, cemetery, and four outbuildings. The house and cemetery are historic, but the four outbuildings are not. Most of the acreage is used as commercial farmland. The house and the cemetery are both surrounded by mature trees. Resource LO 325, Montgomery Farm, is not eligible for the NRHP. One resource (LO 315), the Cox Farm and Miller Cemetery, is located partially within the APE; this resource is not eligible for the NRHP. The remaining architectural resources documented during the field survey are located in the Viewshed.

Table 3-16. Newly and Previously Recorded Historic-Age Architectural Resources

Survey #	Property Address	Resource Name	Preliminary NRHP Recommendation
LO 95	5394 Clarksville Road	Harmony Hall Farm	Previously Determined Eligible
LO 96	4321 Clarksville Road	Watson House	Not Eligible
LO 245	1040 Watermelon Road	Brown Farm and Anderson Cemetery	Not Eligible; Brown House is a Kentucky Landmark
LO 304	2245 Watermelon Road	Speck Farm	Not Eligible
LO 305	2140 Watermelon Road	King-Gotts Farm	Not Eligible
LO 306	2075 Watermelon Road	Dawson-Barnes Farm	Not Eligible
LO 307	1602 Watermelon Road	Dawson House	Not Eligible
LO 308	1324 Watermelon Road	Robert and Tina Dawson House	Not Eligible
LO 309	1209 Watermelon Road	Crawford House	Not Eligible
LO 310	1088 Watermelon Rd	Robertson House	Not Eligible
LO 311	195 A.P. Miller Road	Latham House	Not Eligible

Survey #	Property Address	Resource Name	Preliminary NRHP Recommendation
LO 312	North side of A.P. Miller Road	Cave Spring Cemetery	Not Eligible
LO 313	528 Watermelon Road	Coots House	Not Eligible
LO 314	456 Watermelon Road	Daniel and Ruth Cox House	Not Eligible
LO 315	338 Watermelon Road	Cox Farm and Miller Cemetery	Not Eligible
LO 316	Railroad Corridor from Watermelon Road, Extending 2.1 Miles East	RJ Corman Railroad	Not Eligible
LO 317	5521 Clarksville Road	Ed's Barbecue Restaurant	Not Eligible
LO 318	1.5-Mile Corridor from West of Watermelon Road To East of Old Smokey Road	U.S. 79/Clarksville Road	Not Eligible
LO 319	5173 Clarksville Road	Finch House	Not Eligible
LO 320	5170 Clarksville Road	Townsend House	Not Eligible
LO 321	4890 Clarksville Road	Miller House	Not Eligible
LO 322	4692 Clarksville Road	Scott House	Not Eligible
LO 323	4683 Clarksville Road	Scott Farm	Not Eligible
LO 324	515 Marian Acres Road	Marion Acres Farm and Whitaker Cemetery	Not Eligible
LO 325	1969 Montgomery Road	Montgomery Farm	Not Eligible
LO 326	1091 Green Downs Road	Green Downs Farm	Not Eligible

One of the resources, the Harmony Hall Farm (LO 95), had been previously determined eligible for listing in the NRHP. In 2007, the Kentucky SHPO designated the Brown House on the Brown Farm and Anderson Cemetery (LO 245) as a Kentucky Landmark, an honorary designation that indicates the house is worthy of preservation.

New South recommended that the Harmony Hall Farm (LO 95) remains eligible for listing in the NRHP and further recommended NRHP boundary of 4.36 acres. The proposed Project undertaking is located approximately 0.4 miles south and west of the Harmony Hall Farm. New South recommended that the remainder of the surveyed resources within the APE are not eligible for listing in the NRHP, either individually or as part of a district. TVA is in consultation with KHC on these findings and recommendations (Appendix D).

3.8.2 Environmental Consequences

3.8.2.1 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 cultural resources. However, if the Project site were to be developed by other parties without consultation with KHC and federally recognized tribes, adverse effects could occur to cultural resources.

3.8.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, Russellville Solar would construct and operate a 173-MW AC single-axis tracking PV solar power facility.

Resource LO 245, the Brown Farm and Anderson Cemetery, would be avoided in the currently proposed layout. Additionally, the house and cemetery are both surrounded by mature trees that would remain as visual buffer.

The proposed undertaking would install solar panels within a 1,569-acre Project site located 0.4 miles south and west of the recommended NRHP boundary for the Harmony Hall Farm. Due to the resource's distance from the facility and the fact that the solar facility would be bounded by a visual buffer a double row of eight-foot-high trees planted in a staggered pattern around the perimeter, the facility would not be visible from the resource and therefore would have no effect on the resource.

The current use of the Harmony Hall Farm would not be impacted, nor would any of the resource's physical features within the recommended NRHP boundary. Upon completion of the proposed undertaking, the farmhouse at the Harmony Hall Farm would remain an excellent example of Greek Revival-style architecture. The private owner would retain ownership of the Harmony Hall Farm, and the Project would not take any right-of-way or easements from within the recommended NRHP boundary. The distance from the Project and the rolling hills that exist between the Harmony Hall Farm and the Project area would prevent any change to the visual, audible, or atmospheric character surrounding the Harmony Hall Farm. These impacts would be further diminished by the installation of the visual buffer of a double row of eight-foot-high trees planted in a staggered pattern around the Project, hiding it from view from locations much nearer to the Project location. The proposed undertaking would not be visible from Watermelon Road. Thus, the Project would have no direct effect on the Harmony Hall Farm.

Based on the recommendations on effects, TVA determined that the Project would not result in an adverse effect on the Harmony Hall Farm. TVA also determined that the eight archaeological sites (15LO297, 15LO332, 15LO357, 15LO358, 15LO367, 15LO405, 15LO410 and 15LO412) with unknown NRHP eligibility would be avoided; therefore, no significant archaeological sites would be affected by the Project. Anderson Cemetery, the Ogden Gravesite, and Miller Cemetery, and the Anderson Cemetery contain intact human burials and would be avoided. TVA is consulting with KHC and federally recognized Indian tribes regarding its determinations (Appendix D). TVA is also consulting with federally recognized Indian tribes regarding properties of religious or cultural importance to their tribe.

3.8.2.3 Cumulative Impacts

The Project would avoid all of the NRHP-undetermined eligibility archaeological sites on the Project site, as well as the three cemeteries. The Project would have no visual effects on the one eligible architectural resource in the vicinity. While the RFFAs may have adverse effects on cultural resources, the Project would not contribute to cumulative effects due to the Project effects being avoided or not considered adverse. TVA will continue consultation with KHC and federally recognized Indian tribes on its NRHP eligibility determinations, findings of effect, and avoidance, minimization, and mitigation measures.

3.9 Utilities

3.9.1 Affected Environment

The Project site is within a rural agricultural area of Logan County, Kentucky, approximately two miles southwest of the city of Russellville. This section describes utility services in the Project area and the effects of the alternative actions on those services.

3.9.1.1 Telecommunications

In addition to various mobile providers, telecommunication services are provided by AT&T, Logan Telephone Cooperative, Suddenlink Communications, Russellville Electric Plant Board, Velocity Networks of Kentucky, and Viasat (LEAD 2021).

3.9.1.2 Electricity

Electrical service is provided by PRECC and Russellville Electric Plant Board, both of which purchase power generated by TVA (LEAD 2021). PRECC also has an existing distribution line that runs along Joe Montgomery Road and connects to TVA's existing Springfield-Logan Aluminum 161-kV TL, which crosses the northeastern portion of the Project site in a north-south orientation.

3.9.1.3 Natural Gas

Natural gas service is provided by Atmos Energy (LEAD 2021). There are no known natural gas pipelines in the Project site.

3.9.1.4 Water and Sewer

Water and sewer service are provided either by Logan Todd Regional Water Commission or through private wells and private septic systems (LEAD 2021).

3.9.2 Environmental Consequences

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 remain a mix of agricultural and forested land for the foreseeable future, and existing on-site utilities would likely remain unchanged, with the exception of potential upgrades and maintenance. However, if the Project site were to be developed by other parties, impacts to utilities could occur.

3.9.2.2 Proposed Action Alternative

Modifications to existing utilities would occur with implementation of the Proposed Action Alternative. PRECC would relocate portions of their existing distribution lines in the western

portion of the Project site to avoid PV module locations. This would include installation of approximately 0.4 mile of OPGW and reconductoring on Springfield-Logan Aluminum 161-kV TL between Structure 173 and Structure 175. Electrical service for the Project would be provided by either PRECC or the adjacent TVA TL and the Project distribution power system. If utilized, PRECC would coordinate with customers if outages were necessary. If the TVA TL is utilized, TVA would negotiate an agreement with PRECC to supply the power to the solar facility. The Project would obtain water by groundwater wells or by delivery via water trucks.

The Project-related TL upgrades may result in short-term adverse impacts to local utilities such as electrical service due to brief outages. The additional electric system modifications to existing TVA substations would require a temporary electric service outage of the Springfield-Logan Aluminum 161-kV TL, lasting a minimum of a few days. No long-term adverse impacts are expected to be associated with the Project. Implementation of the Proposed Action Alternative would result in additional renewable energy resources in the region and would, thus, constitute a beneficial impact to electrical services across the region.

3.9.2.3 Cumulative Impacts

The Project could cause occasional, short-term adverse impacts to local utilities such as electricity connections when conducting the TL upgrades, the additional electric system modifications to existing TVA substations, bringing the solar PV facility on-line, or during routine maintenance of the facility. Thus, the Project, along with the past, present, and RFFAs, may contribute to some minor short-term outages in the Project area as these facilities are constructed or maintained. Given the nature of the Proposed Action, long-term cumulative adverse impacts to utilities are not anticipated.

3.10 Waste Management

3.10.1 Affected Environment

“Hazardous materials” and “hazardous waste” are substances that, 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 (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.

Available historical maps obtained from a Phase I ESA document that land use in the Project area has remained relatively unchanged at least since 1952 but likely earlier, based on historical trends. Throughout this time, land uses in the Project area have been primarily agricultural and rural-residential with some wooded areas. Primary changes since the 1950s include the addition

and removal of homesteads, the addition of the TL across the northeast corner of the Project site, and the development of agricultural land and the addition of farm ponds.

Collection and disposal of solid waste outside of incorporated municipalities in Logan County is conducted by private trash collecting companies and by county residents via a drop-off facility. Nonhazardous wastes are transferred and hauled to an operating Class I facility in Madisonville, Kentucky. Construction/demolition materials are disposed of at a Class III landfill in Beaver Dam, Kentucky or White Plains, Kentucky. Various vendors offer hazardous waste removal.

3.10.2 Environmental Consequences

3.10.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no Project-related waste would be generated and no impacts to waste management resources would occur. Existing land use would remain a mix of agricultural and undeveloped land, and existing waste management conditions would remain as they are at present. However, if the Project site were to be developed by other parties and waste management BMPs were not followed, impacts to waste management resources could occur.

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 during construction and would be minor and temporary.

3.10.2.2.1 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, 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 on-site personnel.

Fueling of some construction vehicles would occur in the construction area. Other mobile equipment would return to the on-site 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 14 to 18 months during construction of the Project. The total volume of the on-site 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 of "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, 2011). The SPCC plan would be prepared prior to construction to prevent oil discharges during facility operations.

During operations, 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 transformer oil 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.

Russellville 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.

3.10.2.2.2 Waste Management

Construction, operation, and decommissioning of the Project would generate solid waste. Construction of the Proposed Action is estimated to result in the generation of approximately 36,500 to 73,000 cubic yards of solid waste (912 to 1,824 loads at 40 cubic yards each) consisting of construction debris and general trash, including pallets and flattened cardboard module boxes. Logan County Solar estimates that approximately 2,600-5,200 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 3-17.

Table 3-17. Summary of construction waste streams and management methods

Waste stream	Origin and composition	Estimated frequency of generation	On-site treatment	Waste management method/off-site treatment
Construction waste – hazardous	Empty hazardous material containers	Intermittent	None	Return to vendor

Waste stream	Origin and composition	Estimated frequency of generation	On-site treatment	Waste management method/off-site treatment
Construction waste-hazardous	Used oil, hydraulic fluid, oily rags	Intermittent	None	Recycle, remove to off-site disposal location
Construction waste-nonhazardous	Steel, glass, plastic, wood/pallets, cardboard, paper	Intermittent	None	Recycle wherever possible, otherwise dispose to Class I landfill
Sanitary waste-nonhazardous	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 operations are summarized in Table 3-18. Universal wastes and unusable materials produced as a result of implementation of the Proposed Action would be handled, stored, and managed in accordance with Kentucky Universal Waste requirements.

Table 3-18. 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
Oily rags, oil absorbent, and oil filters– petroleum-related wastes	Various	One 55-gallon drum per 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

The prevention of leaks at the BESS would be handled onsite through appropriate containment and spill prevention measures. Other wastes, including batteries that are replaced during facility operation or when the system is decommissioned, will be disposed of offsite and/or recycled in accordance with manufacturer recommendations and appropriate regulations and industry BMPs.

Waste collection and disposal would be conducted in accordance with applicable federal, state, and local regulatory requirements to minimize health and safety effects. To the extent permissible, waste would 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, Russellville Solar or its contractor would obtain a hazardous waste generator identification number from the State of Kentucky prior to generating any hazardous waste. Any spills related to the Project would be reported to KEEC. A sampling and cleanup report would be prepared for the solar facility and sent to KEEC 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 Russellville Solar environmental specialist.

3.10.2.2.3 Wastewater

Permanent toilets would be installed to support full-time staff during operations. These toilets would be connected to a Project septic system. 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 are anticipated from wastewater treatment and disposal associated with the permanent toilets and associated septic system.

3.10.2.3 Cumulative Impacts

Past, present and RFFAs, together with the Proposed Action, would create new waste streams within the area. Storage and use of liquid materials in the form of petroleum-based oils and fuels, and generation of liquid and solid wastes in the work of used oil, construction debris, packing materials, and general construction waste would also occur. Overall, the Project effects, likely similar to the past, present, and RFFAs, would be mitigated through implementation of BMPs for waste and wastewater, SPCC plans, and hazardous material business plans. With proper planning and implementation of BMPs, adverse cumulative effects from the Project in relation to waste management would not occur.

3.11 Public and Occupational Health and Safety

3.11.1 Affected Environment

The Project site is currently private property, and agricultural and forested land uses dominate. Public emergency services in the area include urgent care clinics, hospitals, law enforcement services, and fire protection services.

The Fast Pace Health Urgent Care – Russellville Clinic, located on US 79, approximately two miles (four minutes) northeast of the Project site, is the closest urgent care center to the Project site. The Logan Memorial Hospital is the closest hospital, also located in Russellville, approximately five miles (10 minutes) northeast of the Project site.

Law enforcement services in the city of Russellville are provided by the Russellville Police Department, approximately four miles (nine minutes) northeast of the Project site. Law enforcement services in Logan County are provided by the Logan County Sheriff's Department in Russellville, approximately four miles (nine minutes) from the Project site. Fire protection services are provided by the Russellville Rural Fire Department and Russellville Fire Department, located approximately four miles (eight minutes) and five miles (10 minutes), respectively, from the Project site.

The KDEP 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

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 remain a mix of agricultural and forested land for the foreseeable future, and existing public health and safety issues would be expected to remain as they are at present. However, if the Project site were to be developed by other parties, impacts to public health and safety could occur if proper BMPs were not followed.

3.11.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, workers on the Project site would have an increased safety risk during construction of the proposed solar facility. 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 construction areas would experience increased employee,

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 the Project 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 on-site 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 would be provided by the local, regional, and state law enforcement, fire, and emergency responders.

Public health and safety hazards could result from a fire during the construction of the BESS. If a fire were to occur, flammable and toxic gases could be released. Proper storage, handling, and ventilation would be employed to reduce the risk of potential hazards.

During operations, the Project would require some permanent staff and/or contract employees on site to manage the sheep operations and the land, which would help deter squatters from occupying the Project site and contribute to community safety.

During operation, solar PV systems generate electromagnetic fields (EMF). However, according to a study published by North Carolina State University (2017), solar PV technologies and solar inverters do not pose significant human health risks. EMF produced by electricity has enough energy to produce heat but not enough to remove electrons from a molecule or damage DNA. Distance from the EMF source, such as provided by the solar panel setbacks and security fencing proposed to surround separate portions of the Project, renders the exposure to EMF insignificant and, therefore, not harmful to human health. The strength of the EMF present at the perimeter of a solar facility within a building is substantially lower than the typical exposures to EMF from household sources such as refrigerators and microwave ovens (NIOSH 2014).

Overall, impacts to public health and safety in association with implementation of the Proposed Action would be considered temporary and minor.

3.11.2.3 Cumulative Impacts

As with the past, present, and RFFAs, the Project would comply with OSHA regulations and health and safety plans to prevent or minimize the negative effects of worker-related accidents. The Project would also comply with SPCC plans, hazardous material plans, and other waste management BMPs to avoid or minimize related health and safety issues. With proper planning and implementation of BMPs, cumulative impacts from the Project in relation to public health and safety would not occur.

3.12 Transportation

3.12.1 Affected Environment

3.12.1.1 Roads

The Project site is bounded on the west by Watermelon Road and the RJ Corman Railroad, which roughly parallels US 79 approximately a quarter mile south of the highway. Watermelon Road is a two-lane paved public road that extends north-south along the western boundary of the Project site. A.P. Miller Road, a two-lane gravel road traverses east-west through western and central portions of the Project site. A.P. Miller Road provides access to the Project site through its connection with Watermelon Road. Joe Montgomery Road, a two-lane road with paved and gravel portions traverses north-south through eastern portions of the Project site. Joe Montgomery Road provides access to the Project site through its connection with US 79. US 79 in the Project vicinity is a two-lane undivided federal highway that extends northeast-southwest, approximately a quarter mile from the northwestern terminus of the Project site. There are also a few unnamed private dirt roads that extend through the Project site.

3.12.1.1.1 Road Traffic

Existing traffic volumes on some of the roads in the Project area were determined using 2018 and 2019 Average Annual Daily Traffic (AADT) counts measured at existing KYTC stations (KYTC 2021). Three KYTC stations (Stations 506, B18, and B60) are located within one mile of the Project site. The 2018 AADT count for Station 506, located on Watermelon Road approximately one mile southwest of the Project site, was 377 vehicles. The 2018 AADT count for Station B18, located on US 79 approximately one mile north of the Project site, was 4,441 vehicles. The 2019 AADT count for Station B60, located on US 431 (Russellville Bypass) approximately one mile northeast of the Project site, was 4,380 vehicles.

3.12.1.2 Rail and Air Traffic

The closest rail line is the RJ Corman Memphis Line, a short line railroad that extends north-south adjacent to the western boundary of the Project site. The closest general aviation airport is the Russellville-Logan County Airport in Russellville, Kentucky, located approximately five miles east of the Project site. The closest regional airport is the Clarksville-Montgomery County Regional Airport in Clarksville, Tennessee, located approximately 28 miles southwest of the Project site. The closest major airport, and the only one in the vicinity with regular commercial passenger service, is the Nashville International Airport in Nashville, Tennessee, approximately 45 miles south of the Project site.

3.12.2 Environmental Consequences

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 remain a mix of agricultural and forested land for the foreseeable future, and the existing transportation network and traffic conditions would be expected to remain as they are at present. However, if the Project site were to be developed by other parties and the city of Russellville were to expand southward, impacts to the existing transportation network and traffic conditions could occur.

3.12.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, the development of the solar facility would result in minor direct impacts to road traffic due to an increase in construction related traffic in the vicinity of the Project site. Subject to weather, construction activities would take approximately 14 to 18 months to complete using a crew of approximately 450 workers maximum. Work would generally occur during daylight hours for five to seven days a week. A majority of these workers would likely come from the local area or region. Other workers could come from outside the region, and if so, many would likely stay in local hotels in the vicinity. It is anticipated that workers would drive personal vehicles to the Project area. Some of the individual workers and work teams would likely visit local restaurants and other businesses during the construction phase of the Project.

Due to the proximity of the Project site to the city of Russellville, possible minor to moderate traffic impacts along Watermelon Road, US 79, and US 431 could occur, as a portion of the construction workers would likely commute to the Project site from and through Russellville. Effects could be moderate on portions of US 79, given that the road is currently experiencing high volumes in comparison with its capacity and is pending a widening project, as discussed in the introduction to Chapter 3. 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. Use of mitigation measures, such as posting a flag person during heavy commute periods to manage traffic flow, prioritizing access for local residents, and implementing staggered work shifts during daylight hours, would minimize potential adverse impacts to traffic and transportation to minor or negligible levels.

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

Overall, direct impacts to transportation resources associated with implementation of the Proposed Action would be anticipated to be minor during construction due to the influx of workers traveling to and from the Project site. These impacts would be temporary and minimized through appropriate mitigation. The Proposed Action would not result in any indirect impacts to transportation.

3.12.2.3 Cumulative Impacts

The Project would implement minimization and mitigation measures if Project construction is expected to disrupt normal traffic patterns; thus, Project effects to road traffic would be temporary, minor, and minimized or mitigated. While effects to local, regional, and major airports is not anticipated, TVA would coordinate with the Federal Aviation Administration regarding potential effects to the Russellville-Logan County Airport given its proximity. Past, present, and RFFAs are also expected to result in minor impacts to transportation. The construction of the Proposed Action could potentially coincide with the US 79 Bridge Replacement project which could contribute to cumulative impacts to traffic. The potential development of the West Industrial Park and Camp Property could also contribute to cumulative impacts to traffic depending on the timing of those projects. However, impacts would be short term and

coordination could occur to minimize impacts to local commuters. Overall, with implementation of minimization and mitigation measures, the Project is not expected to contribute to cumulative impacts to area transportation.

3.13 Socioeconomics

3.13.1 Affected Environment

The Project site is in an unincorporated portion of central Logan County, Kentucky, approximately two miles southwest of the city of Russellville. The Project site falls entirely within the U.S. Census Bureau (USCB) 2010 Census Tract (CT) 9605, which encompasses 4.3 percent of the entire area of CT 9605 (Figure 3-12). Generally, CT 9605 encompasses the incorporated and unincorporated portions of the city of Russellville south of US 68 and US 79. Logan County is primarily rural and does not include any densely populated areas.

3.13.1.1 Population and Demographics

In 2020, the population of CT 9605 was 4,308, Logan County was 27,432, and Kentucky was 4,505,836, representing increases of 7.4 percent, 2.2 percent, and 3.8 percent, respectively, since 2010 (USCB 2021a). The Kentucky State Data Center (2016) projects that the population of Logan County will decrease by approximately 6.6 percent by 2040 while Kentucky will continue to increase by 8.5 percent by 2040 (Table 3-19).

Table 3-19. Population trends in the Project area

Geography	2010 Census ¹	2020 Census ²	Percent Change 2010-2020	Projection 2040	Percent Change 2020-2040
CT 9605	4,012	4,308	+7.4	--	--
Logan County	26,835	27,432	+2.2	25,618	-6.6
Kentucky	4,339,367	4,505,836	+3.8	4,886,381	+8.5

¹ 2010 USCB Decennial census

² 2020 USCB Decennial census

Sources: Kentucky State Data Center 2016; USCB 2021a

According to the 2015-2019 American Community Survey 5-Year Estimates (2019 ACS), the population of CT 9605 and Logan County had higher median ages (40.1 years and 40.7 years, respectively) than Kentucky (38.9 years) (USCB 2021a).

3.13.1.2 Employment and Income

According to the 2019 ACS, 52.8 percent of the CT 9605 population are in the labor force, slightly lower than the county and state percentages (55.5 percent and 59.3 percent, respectively) (Table 3-20). In CT 9605 and Logan County, more civilians are employed in manufacturing than in other industries. In the state, educational services, health care, and social assistance employs the highest percentage of civilian workers. The unemployment rate for CT 9605 (4.6 percent) was lower than the county and state unemployment rates during the same period (5.0 percent and 5.6 percent, respectively). According to the most recent monthly unemployment data, the December 2021 unemployment rates for the county and state were 2.7 percent and 3.9 percent, respectively (BLS 2022a, 2022b). According to the 2019 ACS, the

median household income for CT 9605 was \$51,782, which was more than the county and state (\$48,014 and \$50,589, respectively).

Table 3-20. Employment and income in the Project area

Geography	% Civilian Labor Force, 2019 ACS	Unemployment Rate, 2019 ACS	Unemployment Rate, Dec. 2021	Median Household Income, 2019 ACS
CT 9605	52.8	4.6	--	\$51,782
Logan County	55.5	5.0	2.7	\$48,014
Kentucky	59.3	5.6	3.9	\$50,589

Sources: BLS 2021a; BLS 2021b; USCB 2021a

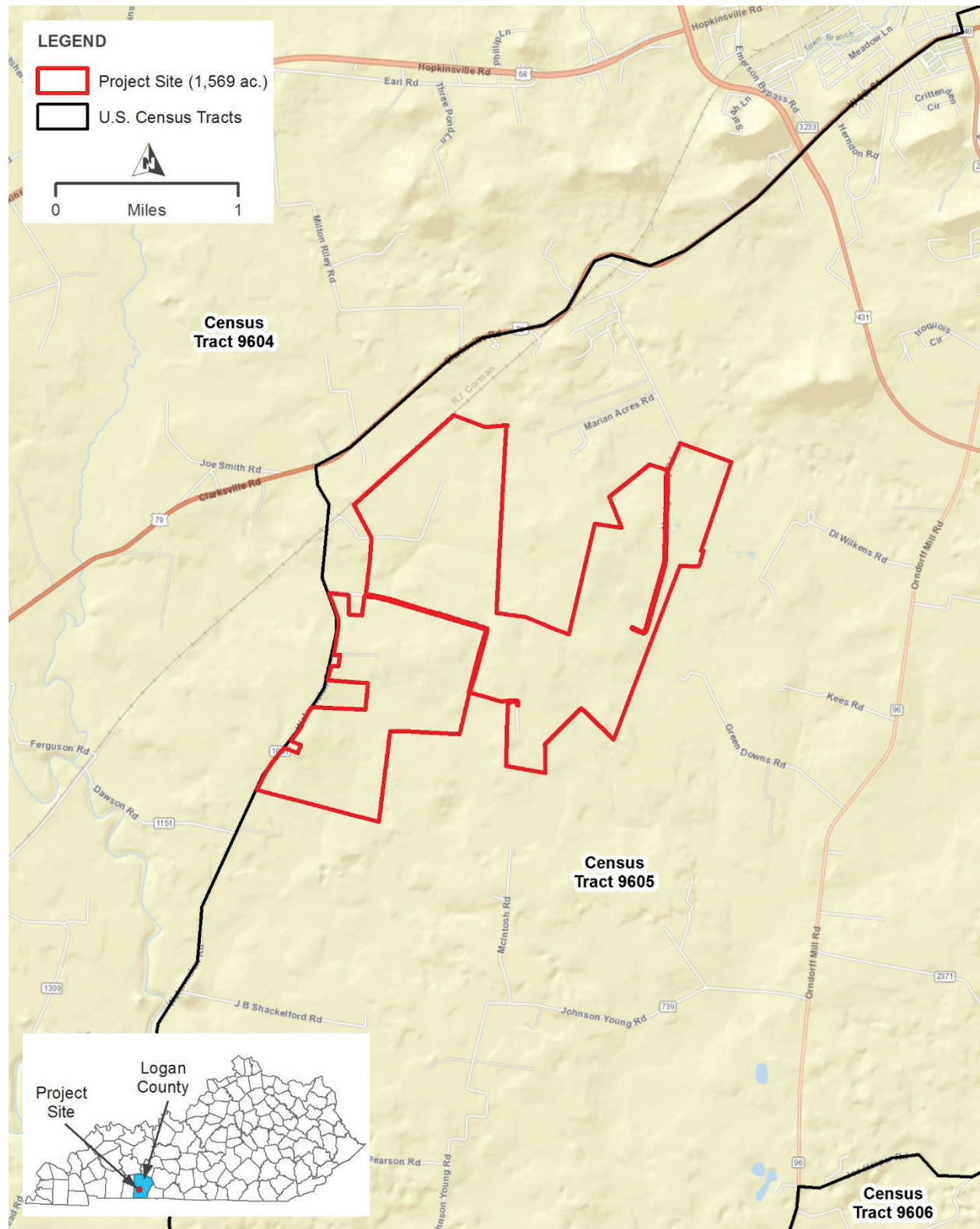


Figure 3-12. 2010 U.S. Census Bureau census tracts in the Project area

3.13.2 Environmental Consequences

3.13.2.1 No Action Alternative

Under the No Action Alternative, the proposed solar facility would not be constructed; therefore, no Project-related impacts to socioeconomics would occur. Existing socioeconomic conditions would remain as they are at present or change at approximately the current rate. However, if the Project site were to be developed by other parties and the city of Russellville were to expand southward, beneficial or adverse effects to socioeconomics could occur.

3.13.2.2 Proposed Action Alternative

Under the Proposed Action Alternative, a new solar facility would be built in the Project area. Subject to weather, construction activities would take approximately 14 to 18 months to complete using a crew of approximately 450 workers maximum. Work would generally occur during daylight hours for five to seven days a week. 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 Logan 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, many of the construction workforce would likely be sought locally or within 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 proposed solar facility could have minor beneficial indirect impacts to population and short-term employment and to income levels in Logan County.

During operations, the Project may require small groups of staff to be on site occasionally to manage the facility and conduct regular inspections, as well as some shepherds to manage the on-site sheep herd on a regular basis. Therefore, operations of the solar facility would have a minor beneficial impact on employment and the population in Logan County.

Overall, socioeconomic impacts for the operation of the proposed solar facility would be beneficial and long-term, but minor 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 Logan County and the vicinity.

3.13.2.3 Cumulative Impacts

Economic benefits of the Proposed Action and the past, present, and RFFAs considered for this analysis include the purchase of materials, equipment, and services, and moderate short- to long-term increases in employment and income. These increases would be local or regional, depending on where the goods, services, and workers have been or are obtained. Overall, short- to long-term, moderate beneficial cumulative impacts to socioeconomics would result from implementation of the Proposed Action in combination with the other actions considered in

the area. Indirect, cumulative impacts to socioeconomics would also occur from the expenditure of wages earned by the workforce involved in construction activities and facility operations.

3.14 Environmental Justice

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.

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, such as the surrounding city or county (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), Hispanic, or those indicating two or more races.

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 2020 poverty threshold for individuals under age 65 was \$13,465 and the official poverty rate for the U.S. as a whole in 2020 was 11.4 percent (USCB 2021b).

Based on CEQ guidance, USCB data reported in the 2020 ACS were used to identify minority and low-income populations in the Project area. The Project site lies within block group (BG) 2, CT 9605 (Figure 3-12).

3.14.1.1 Minority Population

According to the USEPA EJSCREEN, an environmental justice screening and mapping tool, on the Project site and within a three-mile radius of the approximate center of the Project site, the minority population is estimated to be 14 percent (USEPA 2020). Within BG 2, CT 9605, the USCB-estimated minority population was lower than the county and the state (Table 3-21). While the USCB and USEPA findings differ, both indicate a minority population in the Project area under the 50 percent threshold noted in CEQ guidance.

Table 3-21. Minority population in the Project area

Geography	Minority Population¹	% Minority Population
BG 2, CT 9605	118	7.8
Logan County	3,074	11.4
Kentucky	704,974	15.8

Source: USCB 2021a

¹ Those reporting White Alone, Not Hispanic are those counted as nonminorities. All others, including White Alone,

Hispanic, are included in the minority population.

3.14.1.2 Poverty

According to the USEPA EJSCREEN, on the Project site and within a three-mile radius of the Project site, the low-income population is estimated at 36 percent (USEPA 2020);¹ however, within BG 2, CT 9605, the USCB-estimated poverty rate for all people was lower than the county and the state (Table 3-22).

Table 3-22. Poverty in the Project area

Geography	Per Capita Income (\$)	Poverty Rate, All People (%)
BG 2, CT 9605	27,413	9.0
Logan County	24,221	17.0
Kentucky	28,178	17.3

Source: USCB 2021a

3.14.2 Environmental Consequences

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. However, if the Project site were to be developed by other parties and the city of Russellville were to expand southward without protections against disproportionately high and adverse impacts on minority and low-income populations, potential impacts to environmental justice populations could occur.

3.14.2.2 Proposed Action Alternative

Based on the analyses, minority population and poverty rates are lower in the Project area than in Logan County or Kentucky. The overall impacts of the Project, as described in other sections in this chapter, most of which would occur during the 18-month construction period, would be minor, and off-site impacts would be negligible. As such, no disproportionately high or adverse direct or indirect impacts on environmental justice populations due to human health or environmental effects are expected to result from the Proposed Action. Rather, the Project is

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 2 (as a fraction of individuals for whom ratio was determined).” The source of the minority data in EJScreen is USCB 2014 to 2018 ACS 5-Year Estimates (2018 ACS).

expected to have beneficial effects to the local economy that would potentially benefit low-income populations.

3.14.2.3 Cumulative Impacts

Based on the analysis conducted, it was determined that impacts resulting from construction of the Proposed Action Alternative would not result in disproportionately high and adverse impacts to any environmental justice populations in the Project area. It is acknowledged that minority and low-income populations are present within the Project area; however, there is not a disproportionately high and adverse effect to environmental justice populations when compared to the impacts borne by all populations in and around the Project area. As with the past, present, and RFFAs, the Project would consider impacts to environmental justice populations within the Project boundaries and surrounding area. With proper planning, cumulative impacts from the Project in relation to environmental justice would not occur.

CHAPTER 4 – REASONABLY FORESEEABLE ENVIRONMENTAL TRENDS AND PLANNED ACTIONS

4.1 Unavoidable Adverse Environmental Impacts

The Proposed Action could cause some unavoidable adverse environmental effects. 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 during daylight hours. 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. The Project would result in minor, temporary direct impacts to land use due to the conversion of the Project site from agricultural and forest to industrial during construction. Long-term, minor beneficial impacts are anticipated due to regenerative agricultural practices that would allow for dual land use on the Project site.

With the application of appropriate BMPs, no unavoidable adverse effects to groundwater are expected. Minor unavoidable adverse impacts affecting approximately 16 linear feet of one non-jurisdictional intermittent stream and approximately 0.01 acre of one non-jurisdictional emergent linear wetland due to the construction of road crossings using culverts are anticipated. A long-term adverse effect would result from the clearing of 93 acres of forest the associated forest-dependent wildlife. Revegetation of the Project site with native and/or noninvasive vegetation would convert large areas of current cropland to more diverse, managed grassland. The Project would maintain minimum 100-foot buffers around the five identified sinkhole fissures/karst features. The Project is not likely to adversely affect any federally listed species and would have a minor adverse effect on state-listed species. Consultation with USFWS under Section 7 of the ESA is underway regarding potential impacts to federally listed bat species.

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 adversely affect current short-term uses of the Project site by converting it from agricultural and undeveloped land to a solar power generation facility. 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. See Section 2.2.5 for additional information on the decommissioning process.

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 Alternative would involve irreversible commitment of fuel and resource labor required for the construction, maintenance, and operation of the Solar system. Because removal of the solar arrays and associated on-site infrastructure could be accomplished rather easily, and the facility would not irreversibly alter the site, the Project site could be returned to its original condition or used for other productive purposes once it is decommissioned. Most of the solar facility components could also be recycled after the facility is decommissioned. See Section 2.2.5 for additional information on the decommissioning process.

CHAPTER 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. Project Environmental Assessment Project Team

Name/Education	Experience	Project Role
TVA		
<i>Elizabeth Smith</i> B.A., Environmental Studies and Geography	12 years in environmental policy and NEPA compliance	NEPA Project Manager and Coordinator, NEPA compliance
<i>Logan Barber</i> B.S., Wildlife and Fisheries Science	10 years of experience in field biology, 5 years of ESA and related biological compliance	Biological compliance
<i>Adam Dattilo</i> M.S., Forestry B.S., Natural Resource Conservation Management	22 years of experience in ecological restoration and plant ecology and 17 years in botany	Vegetation, Threatened and Endangered Species (Plants)
<i>Elizabeth B. Hamrick</i> M.S., Wildlife; B.S., Biology	21 years conducting field biology, 10 years in biological compliance, NEPA compliance, and ESA consultation for T&E terrestrial animals	Terrestrial zoology
<i>Michaelyn Harle</i> Ph.D., Anthropology; M.A., Anthropology; B.A., Anthropology	17 years in cultural resource management	Cultural Resources, NHPA Section 106 compliance
<i>Carrie Williamson, P.E., CFM</i> M.S., Civil Engineering B.S., Civil Engineering	9 years in floodplains and flood risk, 3 years in river forecasting, 12 years in compliance monitoring	Floodplains and Flood Risk
HDR		
<i>Harriet L. Richardson Seacat</i> M.A., Anthropology (Cultural); B.A., Anthropology (Native American Studies minor)	20 years in anthropology, archaeology, history, NHPA and NEPA documentation, and project management	General oversight and review of analyses per project description/internal finalization, coordination with SMEs, Draft EA comment response review, SRC/TVA coordination
<i>G. Noemi Castillo, P.E., PMP</i> B.S., Environmental Engineering M.S., Environmental Engineering	18 years in NEPA documentation, NEPA compliance, noise analyses and air quality analyses	Air quality and GHG, Chapter 4

Name/Education	Experience	Project Role
<i>Mark P. Filardi, P.G.</i> M.S. and B.S., Geology	19 years in hydrogeology and contaminated site assessment and remediation	Geology, Groundwater, Waste
<i>Josh Fletcher, RPA</i> M.A., Anthropology (Archaeology); B.S., Architectural Design	24 years in cultural resources management, regulatory compliance, NEPA documentation, and project management	Cultural resource studies, document preparation
<i>Gracelyn Jones</i> B.A., Environmental Sociology	3 years in regulatory compliance, NEPA compliance, and document preparation	EA compilation and editing, general resource section support, Environmental Justice, Administrative record, Draft EA comment management
<i>Amanda B. Mills</i> M.S., Marine Sciences B.S., Biology	15 years in geology, biology, geology	Biological site review, document preparation
<i>Al Myers</i> Credits toward B.S., Business Administration	24 years in administration	Overall formatting, appendices compilation, and PDF creation
<i>Charles Nicholson</i> 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, 26 years in NEPA compliance	Overall advisor/QC, TVA coordination
<i>Miles Spenrath</i> B.S., Environment and Natural Resources	10 years in NEPA compliance and documentation	GIS mapping, Chapter 1, Chapter 2, Socioeconomics, Land Use, Soils, Farmland, Visual, Utilities, Public H&S, Transportation, Draft EA TVA comment resolution; Draft EA comment management
<i>Kelly Thames. PWS</i> 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	Water resources
<i>Lyranda Thiem</i> M.S., Biology B.S., Biology	4 years in ecology and biology and 2 years in stream and wetland delineations, permitting, and habitat evaluation	Water and biological resources, References, Administrative record

Name/Education	Experience	Project Role
<i>Jessica Tisdale, Certified Ecologist</i> M.S., Forestry B.S., Environmental Sciences	15 years in biological evaluation, analysis and permitting for infrastructure projects and documentation	Biological site review and wildlife resources report, Water and biological resources

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CHAPTER 6 – REFERENCES CITED

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Appendix A – Geology Resources-Related Supporting Information

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June 11, 2021

Mr. Connor Echols
Manager, Project Development
Silicon Ranch Corporation
222 Second Avenue South, Suite 1900
Nashville, Tennessee 37201

RE: Phase I Environmental Site Assessment, dated June 11, 2021
Russellville Solar, Russellville, Logan County, Kentucky

Dear Mr. Echols,

HDR Engineering, Inc. (HDR) has conducted a Phase I Environmental Site Assessment (Phase I ESA) of the Russellville Solar (Project Area), located approximately 2.0 mile southwest of Russellville, in Logan County, Kentucky. This Phase I ESA has been prepared for Silicon Ranch Corporation (SRC) in support of financing and due diligence.

The Project Area consists of approximately 1,568.7 acres of agricultural and timber property and is comprised of nine contiguous, irregularly-shaped parcels identified on the Logan County GIS website as follows:

- Parcel ID #055-00-00-006-00; 431.8 acres
- Parcel ID #055-00-00-010-00; 111.6 acres
- Parcel ID #055-00-00-007-02; 91.4 acres
- Parcel ID #041-00-00-005-00; 189.3 acres
- Parcel ID #055-00-00-011-00; 84.5 acres
- Parcel ID #055-00-00-008-00; 114.1 acres
- Parcel ID #055-00-00-009-01; 72.7 acres
- Parcel ID #055-00-00-016-00; 468.4 acres
- Parcel ID #055-00-00-020-00; 4.9 acres

The Project Area is located east of Clarksville Road (County Route 79), east of Watermelon Road, and west of Orndoff Mill Road and along portions of J. Montgomery Road and A. P. Miller Road within a rural agricultural area of Logan County.

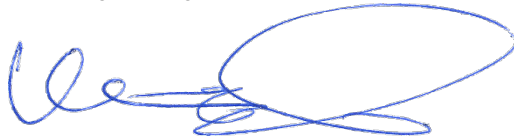
This Phase I ESA was completed to evaluate the potential presence of Recognized Environmental Conditions (RECs) that may adversely affect the Project Area and was conducted in accordance

with the scope and limitations of the ASTM International (ASTM) Practice E 1527-13. Based upon the Findings and Opinions presented in the report, HDR concludes that RECs have not been identified in association with the Russellville Solar property.

A small family cemetery was located on parcel 055-00-00-011-00. Cemeteries are protected from disturbance and desecration under Kentucky state law. Ground disturbance in and near the cemetery, to include a reasonable buffer around the site boundary, should be avoided. Access to the cemetery should be afforded to descendants of the interred. Family visits to the cemetery must be arranged with the landowner. Land managers should set aside a 150-foot buffer around the boundary of the cemetery to better ensure its protection.

HDR appreciates the opportunity to assist SRC on this project. Please do not hesitate to contact the undersigned at (704) 338-6787 or mark.filardi@hdrinc.com if you have questions regarding the aforementioned Phase I ESA.

Sincerely,
HDR Engineering, Inc.

A handwritten signature in blue ink, appearing to read 'Mark Filardi', with a large, stylized loop at the end.

Mark Filardi, PG
Senior Geologist, SAA GeoEnvironmental



Phase I Environmental Site Assessment



Silicon Ranch Corporation:
Russellville Solar

Russellville, Logan County, Kentucky

June 11, 2021





Report of Geotechnical Exploration
Russellville Solar Facility
333 Watermelon Road
Russellville, Kentucky
S&ME Project No. 1280-20-070

PREPARED FOR:

**Silicon Ranch Corp.
222 Second Avenue S, Suite 1900
Nashville, Tennessee 37201**

PREPARED BY:

**S&ME, Inc.
4350 River Green Parkway, Suite 200
Duluth, Georgia 30096**

December 4, 2020



December 4, 2020

Silicon Ranch Corp.
222 Second Avenue S, Suite 1900
Nashville, Tennessee 37201

Attention: Mr. Conor Goodson

Reference: **Report of Geotechnical Exploration
Russellville Solar Facility**
333 Watermelon Road; Russellville, Kentucky
S&ME Project No. 1280-20-070

Dear Mr. Goodson:

S&ME, Inc. (S&ME) is pleased to submit our *Report of Geotechnical Exploration* for the referenced project. Our services were performed in general accordance with our Proposal No. 12-2000385 dated November 13, 2020 and. We appreciate being selected to participate in this phase of the project. Please contact us with any questions about this report or if we may be of further service.

Sincerely,

S&ME, Inc.

A handwritten signature in blue ink that reads "Eric Conway".

Eric Conway, E.I.T.
Staff Professional
econway@smeinc.com

A circular professional engineer seal for the State of Kentucky. The seal contains the text "STATE OF KENTUCKY", "JEFFREY A DOUBRAVA", "28491", and "PROFESSIONAL ENGINEER". A handwritten signature in blue ink is written over the seal.

Jeffrey A. Doubrava, P.E.
Senior Engineer
KY PE Reg. No. 28491
jdoubrava@smeinc.com

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**Appendix B – Water Resources-Related Agency Coordination and
Supporting Information**

Wetland Delineation Report
Russellville Solar
Watermelon Road
Russellville, Logan County, Kentucky

July 31, 2019

Terracon Project No. N1197212



Prepared for:

Community Energy Solar, LLC
Chapel Hill, North Carolina

Prepared by:

Terracon Consultants, Inc.
Cincinnati, Ohio

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD)

To: District Name Here

- I am requesting a JD on property located at: Watermelon Road
(Street Address)
City/Township/Parish: Russellville County: Logan State: Kentucky
Acreage of Parcel/Review Area for JD: 1,600
Section: _____ Township: _____ Range: _____
Latitude (decimal degrees): 36.789914 Longitude (decimal degrees): 86.936531
(For linear projects, please include the center point of the proposed alignment.)
- Please attach a survey/plat map and vicinity map identifying location and review area for the JD.
- I currently own this property. I plan to purchase this property.
- I am an agent/consultant acting on behalf of the requestor.
- Other (please explain): _____.
- Reason for request: (check as many as applicable)
 - I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
 - I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
 - I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
 - I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
 - I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
 - A Corps JD is required in order to obtain my local/state authorization.
 - I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
 - I believe that the site may be comprised entirely of dry land.
 - Other: _____
- Type of determination being requested:
 - I am requesting an approved JD.
 - I am requesting a preliminary JD.
 - I am requesting a "no permit required" letter as I believe my proposed activity is not regulated.
 - I am unclear as to which JD I would like to request and require additional information to inform my decision.

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature: _____ Date: _____

- Typed or printed name: _____
Company name: _____
Address: _____

Daytime phone no.: _____
Email address: _____

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.

Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.

Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.

Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

**TABLE OF AQUATIC RESOURCES IN REVIEW ARE WHICH “MAY BE” SUBJECT
TO REGULATORY JURISDICTION**

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated Amount of Aquatic Resource in Review Area (acreage and linear feet, if applicable)	Type of Aquatic Resource (i.e. wetland, stream, impoundment, etc.)	Geographic authority to which the aquatic resource “may be” subject (i.e., Section 404 or Section 10/404)
Wetland A	36.777328	-86.951289	0.95 ac	Wetland	Section 404
Wetland B	36.779092	-86.958715	1.11 ac	Wetland	Section 404
Wetland C	36.801531	-86.938631	0.88 ac	Wetland	Section 404
Wetland D	36.799868	-86.937797	0.09 ac	Wetland	Section 404
Wetland E	36.798357	-86.938473	0.14 ac	Wetland	Section 404
Wetland F	36.806036	-86.941152	1.84 ac	Wetland	Section 404
Wetland G	36.805283	-86.939728	0.18 ac	Wetland	Section 404
Wetland H	36.797875	-86.925033	0.08 ac	Wetland	Section 404
Wetland I	36.798016	-86.925033	0.03 ac	Wetland	Section 404
Wetland J	36.800322	-86.919266	3.27 ac	Wetland	Section 404
Wetland K	36.798524	-86.916544	1.22 ac	Wetland	Section 404
Wetland L	36.794575	-86.948812	0.74 ac	Wetland	Section 404
Wetland M	36.798215	-86.950261	0.05 ac	Wetland	Section 404

Stream 1	36.779994	-86.958985	207 lf	Stream	Section 404
Stream 2	36.7798061	-86.939915	4,599 lf	Stream	Section 404
Stream 3	36.797394	-86.939915	1,537 lf	Stream	Section 404
Stream 4	36.804994	-86.941152	186 lf	Stream	Section 404
Stream 5	36.807099	-86.940586	365 lf	Stream	Section 404
Stream 5a	36.807099	-86.940586	75 lf	Stream	Section 404
Stream 6	36.807292	-86.936789	84 lf	Stream	Section 404
Stream 7	36.806257	-86.937381	60 lf	Stream	Section 404
Stream 8	36.806298	-86.938409	16 lf	Stream	Section 404
Stream 9	36.806111	-86.938849	28 lf	Stream	Section 404
Stream 10	36.805768	-86.940182	171 lf	Stream	Section 404
Stream 11	36.792987	-86.921303	778 lf	Stream	Section 404
Stream 12	36.795202	-86.922031	1,466 lf	Stream	Section 404
Stream 13	36.797121	-86.922823	685 lf	Stream	Section 404
Stream 14	36.793824	-86.950261	325 lf	Stream	Section 404
Pond 1	36.783648	86.950109	0.92 ac	Pond	Section 404

Pond 2	36.781329	-86.953156	0.70 ac	Pond	Section 404
Pond 3	36.783153	-86.956136	0.42 ac	Pond	Section 404
Pond 4	36.791897	-86.948603	0.46 ac	Pond	Section 404
Pond 5	36.792664	-86.948603	0.70 ac	Pond	Section 404
Pond 6	36.801290	-86.939032	0.25 ac	Pond	Section 404
Pond 7	36.804156	-86.941529	0.81 ac	Pond	Section 404
Pond 8	36.805520	-86.939657	0.23 ac	Pond	Section 404
Pond 9	36.797875	-86.925033	0.70 ac	Pond	Section 404
Pond 10	36.792245	-86.927483	0.31 ac	Pond	Section 404
Pond 11	36.800322	-86.919266	0.26 ac	Pond	Section 404
Pond 12	36.798933	-86.917830	0.22 ac	Pond	Section 404
Pond 13	36.803331	-86.921264	0.29 ac	Pond	Section 404
Pond 14	36.808914	-86.943791	0.35 ac	Pond	Section 404
Pond 15	36.796148	-86.943791	0.74 ac	Pond	Section 404



DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
WEST REGULATORY FIELD OFFICE
2424 DANVILLE ROAD SW, SUITE-N
DECATUR, AL 35603

January 27, 2020

SUBJECT: LRN-2019-00805, Community Energy Solar, LLC.; Approved Jurisdictional Determination, Red River Watershed, Tennessee River Mile 241.6L Russellville, Logan County, Kentucky

Community Energy Solar, LLC.
Mr. Christopher Killenberg
151 East Rosemary Street, Suite 202
Chapel Hill, North Carolina 27514

Dear Mr. Killenberg:

This letter is in regard to your report entitled "Russellville Solar, Watermelon Road, Russellville, Logan County, Kentucky, July 31, 2019" (JD Report) which documented potential waters of the United States on a review area of approximately 1600 acres. This project has been assigned File No. LRN-2019-00805, please refer to this number in any future correspondence.

The U.S. Army Corps of Engineers (USACE) has regulatory responsibilities pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Under Section 10, the USACE regulates any work in, or affecting, navigable waters of the U.S. It appears the review area does not include navigable waters of the U.S. and would not be subject to the provisions of Section 10. Under Section 404, the USACE regulates the discharge of dredged and/or fill material into waters of the U.S., including wetlands.

Enclosed is an approved jurisdictional determination for aquatic resources identified as Stream 11, Stream 12, Stream 13, Wetland A and Wetland H, determined to be jurisdictional, and Streams 1-5, 10 and 14, Wetlands B-G and J-N, Ponds 1-15, that were determined not jurisdictional. The rationale for this determination is provided in the attached Approved Jurisdictional Determination forms. The approved jurisdictional determination expires five years from the date of this letter, unless new information warrants revision of the determination before the expiration date, or the District Engineer identifies specific geographic areas with rapidly changing environmental conditions that merit re-verification on a more frequent basis. This delineation/determination has been conducted to identify the limits of COE's Clean Water Act jurisdiction for the particular site identified in this request. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work. This approved jurisdictional determination is only valid for the review area as shown on the map labeled "LRN-2019-00508, Figure 1"

Site: Russeville Solar - Wetland A	Rater(s): C. Brendel	Date: 7/9/2019
---	-----------------------------	-----------------------

2	
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.95 acre in size.

9	
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

10	
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

9	
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

30

Site:	Rater(s):	Date:
--------------	------------------	--------------

30
subtotal previous page

	0	
max 10 pts.	subtotal	

Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

	5	
max 20 pts.	subtotal	

Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

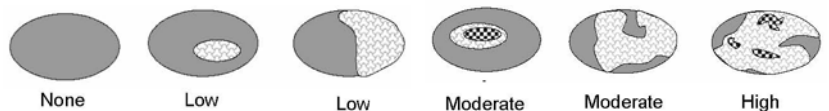
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

35, Category 2

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland B	Rater(s): C. Brendel	Date: 7/9/2019
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	2
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 1.11 acre in size.

	14
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	21
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

50

Site:	Rater(s):	Date:
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50

subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	10	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 2 Emergent
- 3 Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

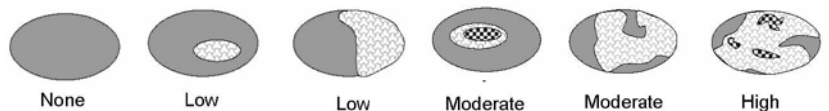
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

65, Category 3

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland C	Rater(s): C. Brendel	Date: 7/9/2019
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	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.88 acre in size.

	14
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	21
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

49

Site:	Rater(s):	Date:
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49
subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	8	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- 1 Shrub
- 3 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

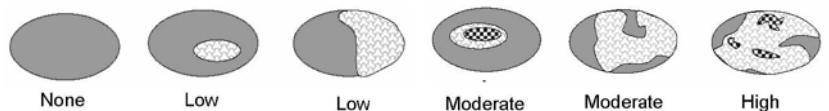
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

62, Category 3

**GRAND TOTAL
(max 100 pts)**

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland D	Rater(s): C. Brendel	Date: 7/9/2019
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0	max 6 pts. subtotal
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Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.09 acre in size.

14	max 14 pts. subtotal
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Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

14	max 30 pts. subtotal
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Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

12	max 20 pts. subtotal
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Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

40

Site:	Rater(s):	Date:
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40

subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	5	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 1 Shrub
- 1 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

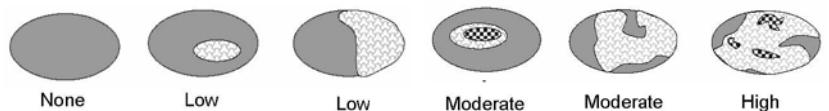
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

50, Category 2

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland E	Rater(s): C. Brendel	Date: 7/9/2019
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	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.14 acre in size.

	14
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	14
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	12
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

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Site:	Rater(s):	Date:
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subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	5	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 1 Shrub
- 1 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

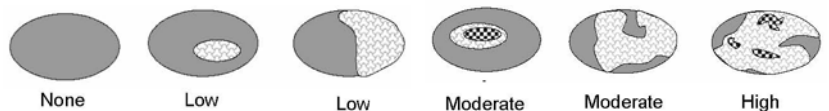
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

51, Category 2

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland F	Rater(s): C. Brendel	Date: 7/9/2019
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	2
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 1.84 acre in size.

	12
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	23
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

50

Site:	Rater(s):	Date:
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50

subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	7	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- 1 Shrub
- 3 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

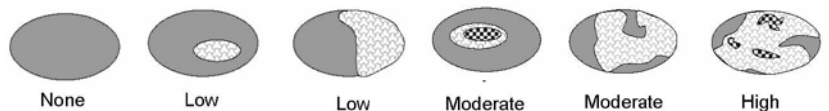
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

62, Category 3

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland G	Rater(s): C. Brendel	Date: 7/9/2019
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	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.18 acre in size.

	12
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	15
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

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Site:	Rater(s):	Date:
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subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	9	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 2 Emergent
- 3 Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

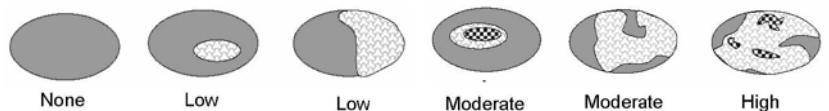
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

55, Category 2

**GRAND TOTAL
(max 100 pts)**

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland H	Rater(s): C. Brendel	Date: 7/9/2019
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	0
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.08 acre in size.

	6
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	14
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	8
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

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Site:	Rater(s):	Date:
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subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	6	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

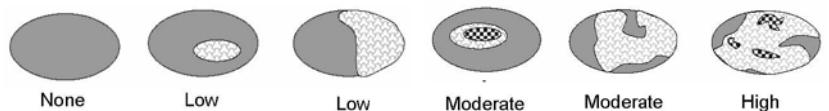
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

39, Category 2

**GRAND TOTAL
(max 100 pts)**

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland J	Rater(s): C. Brendel	Date: 7/9/2019
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	3
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 3.27 acre in size.

	9
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	18
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

43

Site:	Rater(s):	Date:
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43
subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	11	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 2 Shrub
- 3 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- | | |
|-----|--|
| 0 = | Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)] |
| 1 = | Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality |
| 2 = | Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality |
| 3 = | Present and comprises a significant part or more of wetland's vegetation and is of high quality |

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- | | |
|--------|---|
| low = | Low species diversity &/or dominance of nonnative or disturbance tolerant native species |
| mod = | Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species |
| high = | A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species |

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

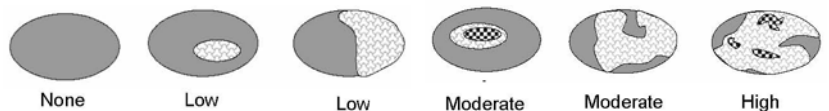
Mudflat and Open Water Class Quality

- | | |
|-----|--|
| 0 = | Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)] |
| 1 = | Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)] |
| 2 = | Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)] |
| 3 = | High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more] |

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- | | |
|-----|--|
| 0 = | Absent |
| 1 = | Present in very small amounts or if more common of marginal quality |
| 2 = | Present in moderate amounts, but not of highest quality or in small amounts of highest quality |
| 3 = | Present in moderate or greater amounts and of highest quality |

59, Category 2

**GRAND TOTAL
(max 100 pts)**

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland K	Rater(s): C. Brendel	Date: 7/9/2019
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	1
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.96 acre in size.

	14
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	14
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

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Site:	Rater(s):	Date:
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subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	6	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 1 Shrub
- 2 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

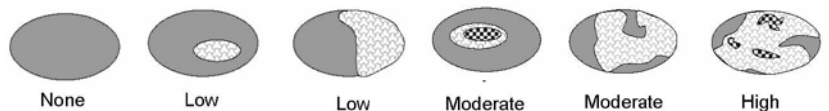
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

53, Category 2

**GRAND TOTAL
(max 100 pts)**

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland L	Rater(s): C. Brendel	Date: 7/9/2019
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	2
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.74 acre in size.

	14
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

	16
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

	13
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

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Site:	Rater(s):	Date:
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45
subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	10	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

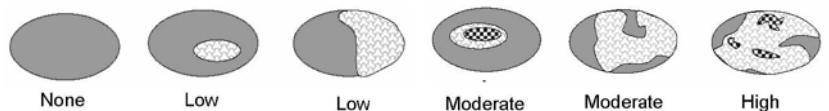
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

60, Category 3

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland M	Rater(s): C. Brendel	Date: 7/9/2019
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0	max 6 pts. subtotal
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Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.05 acre in size.

11	max 14 pts. subtotal
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Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

14	max 30 pts. subtotal
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Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

12	max 20 pts. subtotal
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Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

37

Site:	Rater(s):	Date:
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37

subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	5	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 1 Shrub
- 1 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
-
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
-
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
-
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
-
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
-
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

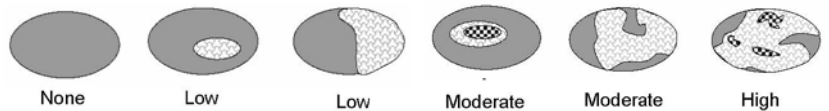
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
-
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
-
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
-
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
-
- 1 = Present in very small amounts or if more common of marginal quality
-
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
-
- 3 = Present in moderate or greater amounts and of highest quality

47, Category 2

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

Site: Russeville Solar - Wetland N	Rater(s): C. Brendel	Date: 7/9/2019
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1	
max 6 pts.	subtotal

Metric 1. Wetland Area (size)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

- Select one size class and assign score.
- >50 acres (>20.2 ha) (6 pts)
 - 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
 - 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
 - 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
 - 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
 - 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
 - <0.1 acre (0.04 ha) (0)

Sources/assumptions for size estimate (list):

ArcGIS was used to measure wetland. The wetland is 0.30 acre in size.

14	
max 14 pts.	subtotal

Metric 2. Upland Buffers and Surrounding Land Use

- 2a. Calculate average buffer width. Select only one and assign score. Do not double check.
- WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
 - MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
 - NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
 - VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)
- 2b. Intensity of surrounding land use. Select one or double check and average.
- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
 - LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
 - MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
 - High. Urban, industrial, open pasture, row cropping, mining, construction (1)

14	
max 30 pts.	subtotal

Metric 3. Hydrology

- 3a. Sources of water. Score all that apply.
- High pH groundwater (5)
 - Other groundwater (3) [BR/CM (5)]
 - Precipitation (1) [unless BR/CM primary source (5)]
 - Seasonal/intermittent surface water (3)
 - Perennial surface water (lake or stream) (5)
- 3b. Connectivity. Score all that apply.
- 100-year floodplain (1)
 - Between stream/lake and other human use (1)
 - Part of wetland/upland (e.g., forest), complex (1)
 - Part of riparian or upland corridor (1)
- 3c. Maximum water depth. Select only one and assign score.
- >0.7 m (27.6 in.) (3)
 - 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
 - <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]
- 3d. Duration inundation/saturation. Score one or dbl. check & avg.
- Semi- to permanently inundated/saturated (4)
 - Regularly inundated/saturated (3) [BR/CM (4)]
 - Seasonally inundated (2) [BR/CM (4)]
 - Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]
- 3e. Modifications to natural hydrologic regime. Score one or double check and average.
- None or none apparent (12)
 - Recovered (7)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> ditch	<input type="checkbox"/> point source (nonstormwater)
<input type="checkbox"/> tile (including culvert)	<input type="checkbox"/> filling/grading
<input type="checkbox"/> dike	<input type="checkbox"/> road bed/RR track
<input type="checkbox"/> weir	<input type="checkbox"/> dredging
<input type="checkbox"/> stormwater input	<input type="checkbox"/> other _____

13	
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development

- 4a. Substrate disturbance. Score one or double check and average.
- None or none apparent (4)
 - Recovered (3)
 - Recovering (2)
 - Recent or no recovery (1)
- 4b. Habitat development. Select only one and assign score.
- Excellent (7)
 - Very good (6)
 - Good (5)
 - Moderately good (4)
 - Fair (3)
 - Poor to fair (2)
 - Poor (1)
- 4c. Habitat alteration. Score one or double check and average.
- None or none apparent (9)
 - Recovered (6)
 - Recovering (3)
 - Recent or no recovery (1)

Check all disturbances observed

<input type="checkbox"/> mowing	<input type="checkbox"/> shrub/sapling removal
<input type="checkbox"/> grazing	<input type="checkbox"/> herbaceous/aquatic bed removal
<input type="checkbox"/> clearcutting	<input type="checkbox"/> woody debris removal
<input type="checkbox"/> selective cutting	<input type="checkbox"/> sedimentation
<input type="checkbox"/> farming	<input type="checkbox"/> dredging
<input type="checkbox"/> toxic pollutants	<input type="checkbox"/> nutrient enrichment

42

Site:	Rater(s):	Date:
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42
subtotal previous page

max 10 pts.	5	subtotal
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Metric 5. Special Wetlands

raw score*

*If the documented raw score for Metric 5 is 30 points or higher, the site is automatically considered a Category 3 wetland.

Select all that apply. Where multiple values apply in row, score row as single feature with highest point value. Provide documentation for each selection (photos, checklists, maps, resource specialist concurrence, data sources, references, etc).

- Bog, fen, wet prairie (10); acidophilic veg., mossy substrate >10 sq.m, sphagnum or other moss (5); muck, organic soil layer (3)
- Assoc. forest (wetl. &/or adj. upland) incl. >0.25 acre (0.1 ha); old growth (10); mature >18 in. (45 cm) dbh (5) [exclude pine plantation]
- Sensitive geologic feature such as spring/seep, sink, losing/underground stream, cave, waterfall, rock outcrop/cliff (5)
- Vernal pool (5); isolated, perched, or slope wetland (4); headwater wetland [1st order perennial or above] (3)
- Island wetland >0.1 acre (0.04 ha) in reservoir, river, or perennial water >6 ft (2 m) deep (5)
- Braided channel or floodplain/terrace depressions (floodplain pool, slough, oxbow, meander scar, etc.) (3)
- Gross morph. adapt. in >5 trees >10 in. (25 cm) dbh: buttress, multitrunk/stool, stilted, shallow roots/tip-up, or pneumatophores (3)
- Ecological community with global rank (NatureServe): G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier]
- Known occurrence state/federal threatened/endangered species (10); other rare species with global rank G1*(10), G2*(5), G3*(3) [*use higher rank where mixed rank or qualifier] [exclude records which are only "historic"]
- Superior/enhanced habitat/use: migratory songbird/waterfowl (5); in-reservoir buttonbush (4); other fish/wildlife management/designation (3)
- Cat. 1 (very low quality) : <1 acre (0.4 ha) AND EITHER >80% cover of invasives OR nonvegetated on mined/excavated land (-10)

max 20 pts.	6	subtotal
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Metric 6. Plant Communities, Interspersion, Microtopography

6a. Wetland vegetation communities.
Score all present using 0 to 3 scale.

- Aquatic bed
- 1 Emergent
- 1 Shrub
- 2 Forest
- Mudflats
- Open water <20 acres (8 ha)
- Moss/lichen. Other _____

Vegetation Community Cover Scale

- 0 = Absent or <0.1 ha (0.25 acre) contiguous acre
[For BR/CM <0.04 ha (0.1 acre)]
- 1 = Present and either comprises a small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
- 2 = Present and either comprises a significant part of wetland's vegetation and is of moderate quality, or comprises a small part and is of high quality
- 3 = Present and comprises a significant part or more of wetland's vegetation and is of high quality

6b. Horizontal (plan view) interspersion.
Select only one.

- High (5)
- Moderately high (4) [BR/CM (5)]
- Moderate (3)[BR/CM (5)]
- Moderately low (2) [BR/CM (3)]
- Low (1) [BR/CM (2)]
- None (0)

Narrative Description of Vegetation Quality

- low = Low species diversity &/or dominance of nonnative or disturbance tolerant native species
- mod = Native species are dominant component of the vegetation, although nonnative &/or disturbance tolerant native species can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered species
- high = A predominance of native species with nonnative sp &/or disturbance tolerant native sp absent or virtually absent, and high sp diversity and often but not always, the presence of rare, threatened, or endangered species

6c. Coverage of invasive plants.
Add or deduct points for coverage.

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

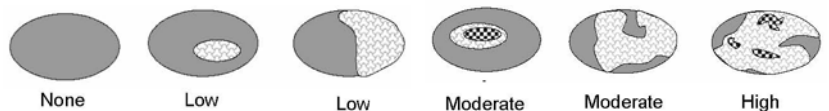
Mudflat and Open Water Class Quality

- 0 = Absent <0.1 ha (0.25 acres) [For BR/CM <0.04 ha (0.1 acre)]
- 1 = Low 0.1 to <1 ha (0.25 to 2.5 acres) [BR/CM 0.04 to <0.2 ha (0.1 to 0.5 acre)]
- 2 = Moderate 1 to <4 ha (2.5 to 9.9 acres) [BR/CM 0.2 to <0.2 ha (0.5 to 5 acre)]
- 3 = High 4 ha (9.9 acres) or more [BR/CM 2 ha (5 acres) or more]

6d. Microtopography.
Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15 cm (6 in.)
- Standing dead >25 cm (10 in.) dbh
- Amphibian breeding pools

Hypothetical Wetland for Estimating Degree of Interspersion



Microtopography Cover Scale

- 0 = Absent
- 1 = Present in very small amounts or if more common of marginal quality
- 2 = Present in moderate amounts, but not of highest quality or in small amounts of highest quality
- 3 = Present in moderate or greater amounts and of highest quality

53, Category 2

GRAND TOTAL
(max 100 pts)

- 0- 29 = Category 1, low wetland function, condition, quality**
- 30- 59 = Category 2, good/moderate wetland function, condition, quality**
- 60-100 = Category 3, superior wetland function, condition, quality**

**Based on ORAM Score Calibration Report for the scoring breakpoints between wetland categories: <http://www.epa.state.oh.us/dsw/401/401.html>

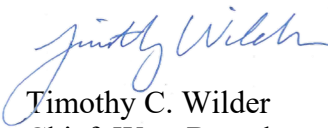
If you object to this decision, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeals Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the Great Lakes and Ohio River Division, Division Office at the following address:

LRD Appeals Officer
U.S. Army Corps of Engineers
Great Lakes and Ohio River Division
550 Main Street, Room 10524
Cincinnati, OH 45202-3222
TEL (513) 684-2699; FAX (513) 684-2460

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date listed on the RFA form. **It is not necessary to submit an RFA form to the Division Office if you do not object to the decision in this letter.**

We appreciate your awareness of the USACE regulatory program. If you have any questions, you may contact me or Gary Davis at (270) 702-1312 or by e-mail at gary.l.davis@usace.army.mil.

Sincerely,



Timothy C. Wilder
Chief, West Branch
Regulatory Division

Enclosures:

Notification of Administrative Appeal Options and Process and Request for Appeal Form
AJD Forms
LRN-2019-00805, Figures 1-3 (12 pages)

Electronic Copies Furnished:

Mr. Scott West, Terracon, Inc.

Memo

Date: Wednesday, November 03, 2021

Project: **Logan County Solar**

To: Russellville Solar, LLC

From: HDR

Subject: **Transmission Line- Jurisdictional Determination**

Russellville Solar LLC (Russellville Solar), a wholly owned subsidiary of Silicon Ranch Corporation (SRC), intends to develop a site in Logan County, Kentucky as a photovoltaic solar power generating facility known as Logan County Solar. The Logan County Solar Field Investigation Boundary encompasses nearly 1,022 contiguous acres in rural Logan County, Kentucky, located approximately two miles southwest of the city of Russellville (Appendix A, Figures 1-3). A jurisdictional determination (JD) verification (LRN-2019-00805) from the United States Army Corps was issued for the Field Investigation Boundary (Appendix B).

Since the issuance of the JD approval, a transmission line upgrade was added as an extension to the Study Area. The transmission line is referred to herein as the "Project." Since the location of the transmission line was not included in the boundaries of the 1,022-acre Field Investigation Boundary, the purpose of this memo is to update the JD information for Russellville Solar's internal records.

Project Location: East of Joe Montgomery Road in Logan County, Kentucky

Basin: Lower Cumberland [HUC: 05130205]

Nearest City: Russellville

County: Logan County

Center Decimal Degree Coordinates of TL: 36.806798/-86.917059

USGS Quadrangle Name: Russellville

Project Description and Recent Weather Conditions

The Transmission Line consists of agricultural fields and narrow strips of ruderal forested area. Dominant species within the agricultural fields is corn (*Zea mays*). Species within the ruderal forested areas included common hackberry (*Celtis Occidentalis*), black walnut (*Juglans nigra*), basswood (*Tilia americana*), blackgum (*Nyssa sylvatica*), black cherry (*Prunus serotina*), flowering dogwood (*Cornus florida*), and sassafras (*Sassafras albidum*) in the canopy and Chinese privet (*Ligustrum sinense*), coral berry bush (*Ardisia crenata*) in the midstory.

**Appendix C – Biological Resources-Related Correspondence and
Supporting Information**



Wildlife and Vegetation Assessment

Russellville Solar, LLC

Logan County, Kentucky
February 16, 2022



Carrie Allison
Wildlife Biologist (Consultation)
U.S. Fish & Wildlife Service
Frankfort Ecological Services Field Office
330 West Broadway, Rm 265
Frankfort, KY 40601

**Subject: Request for Study Plan Concurrence
Silicon Ranch Russellville Solar Farm
Logan County, Kentucky**

Dear Ms. Allison:

Jackson Group is requesting survey methodology concurrence relating to a threatened and endangered bat species presence/probable absence survey for a proposed project in Logan County, Kentucky.

Silicon Ranch Corporation has contracted Jackson Group to conduct a presence/probable absence survey at the proposed Russellville Solar Farm. The proposed project area of interest is approximately 1,569 acres and includes approximately 177 acres of forested habitat that provides potential suitable summer habitat for threatened and endangered bat species (see attached Aerial Map – Figure 1).

The following proposed survey methods are based on the technical criteria outlined in USFWS's *2020 Range-Wide Indiana Bat Summer Survey Guidelines*, dated March 2020. Based on the forested habitat within the project boundary (~177 acres), surveys will be conducted for a total of 18 net nights.

Mist-Net Survey

Jackson Group will survey a total of 18 net nights (2 sites, 3 nets/site for 3 calendar nights). The locations of the net sites will be determined by selecting the best possible net placement (e.g., streams, trails) that are typically the most effective places to survey. Specific sites for net placement will be determined by permitted bat biologists in the field and will follow USFWS (2020) guidelines for mist net surveys. Netting will begin at sunset and last for a minimum of five hours. If severe weather occurs for more than 30 minutes during the first 5 hours of the survey night that night will not count towards the required 3 nights at the site (see Severe Weather section below). Standard two-ply, 50 or 75 denier, nylon mist-nets with a mesh size of 38 millimeters (1.50 inches) will be used at all mist-net sites. Mist-nets will typically be placed in suitable bat habitat and positioned perpendicularly across flight corridors, filling the corridor from side to side and extending from ground-level up to overhanging canopy. Nets will be checked approximately every 10 minutes. Net set locations at the site will be distributed as evenly as possible throughout suitable habitat. Disturbance in the form of noise, light, and/or movement will be minimized at net locations. Additionally, surveyors will decontaminate and/or dispose of field gear according to the most current USFWS white-nose syndrome decontamination protocol. We will also follow the recent COVID-19 guidelines released in a memo by the USFWS in June 2020 suggesting we follow the guidance (<https://www.cdc.gov/coronavirus/2019-ncov/index.html>) of the Centers for Disease Control (CDC) and be in accordance with state, local, and other Federal requirements when handling wild bats. The mist-net location will be recorded using a handheld GPS unit in decimal degrees.

Radio Telemetry

Radio transmitters will be affixed to a maximum of two captured bats per site of the following species: Indiana bats (*Myotis sodalis*) and northern long-eared bats (*Myotis septentrionalis*). Preference will be given to reproductive females and juveniles, however, the first individual of the target species captured will be affixed with a radio transmitter (172 MHz range) regardless of sex if it meets the minimum weight requirements. Bats fitted with a transmitter will be tracked to their diurnal roost. No foraging tracking is proposed. Bats will be tracked during the day within a search radius of 2.5 miles from the point of capture to locate roost trees, up to a maximum of seven days. Daily telemetry searches will be conducted until the bat is located, or for a maximum of 8 hours per day. Telemetry crews, using a vehicle equipped with a five-element Yagi antenna (Wildlife Materials, Carbondale, Illinois), will attempt to track bats from parks, roads, and other public lands within this radius; however, crews will not enter any property without the express consent of the landowner. If access to roost trees is not possible (e.g., located on private property), roost locations will be estimated using triangulation. Where landowner permission is granted to access the roost tree, crews will gather the following information regarding roost trees: tree species, tree condition (living or dead), percent exfoliating bark, diameter at breast-height, estimated percent overstory within stand, and estimated percent understory/midstory within stand. If accessible, a photograph will be taken and the tree's location recorded using a handheld GPS.

A minimum of two emergence surveys will be conducted at each accessible roost tree identified during the tracking period to enumerate bats using the roost. Surveys will begin 30 minutes before dusk and continue until at least one hour after sunset or until the roost tree is not visible without additional illumination.

Severe Weather Definitions (related to mist-net surveys)

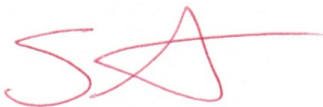
Severe weather is defined as including: temperatures below 10°C (50°F), precipitation (rain or heavy fog), and sustained winds exceeding 4-mph (9-mph). Light rain not lasting more than 30-minutes is not considered severe weather and surveyors may choose to continue netting during these conditions.

Closing

This presence/probable absence survey will strictly follow the technical criteria outlined in the 2020 Range-Wide Indiana Bat Summer Survey Guidelines, as well as any additional recommendations provided by your office. At this time, we respectfully request concurrence with our methodology and level of effort.

Please reply via email to sroberts@jacksongroupco.com with your concurrence, or with any additional requests or guidelines needed for concurrence. If you have any questions or require additional information, please contact me at (859) 623-0499.

Sincerely,



Shane Roberts
Vice President



Enclosures: Figure 1

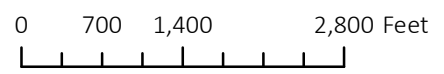


Cave Spring

Text

Legend

-  Project Boundary
-  Potential Survey Site Location



PROJECT	Silicon Ranch Russellville Solar Farm
DESCRIPTION	Bat Survey - Logan County, KY
DATE	05/19/2021





Bat Survey Report

Russellville Solar Project

Russellville Solar LLC
Russellville Solar Project
Logan County, Kentucky

Prepared by:

Jackson Group

3925 Simpson Lane
Richmond, KY 40475
jacksongroupco.com

Prepared for:

Russellville Solar LLC

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**Appendix D – Cultural Resources-Related Correspondence and
Supporting Information**



400 West Summit Hill Drive, Knoxville, Tennessee 37902

April 16, 2021

Mr. Craig Potts
State Historic Preservation Officer
and Executive Director
Kentucky Heritage Council
410 High Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

TENNESSEE VALLEY AUTHORITY (TVA), INITIATION OF CONSULTATION POWER PURCHASE AGREEMENT (PPA), RUSSELLVILLE, LOGAN COUNTY, KENTUCKY (36.765588, -86.975550) (TVA TRACKING NUMBER – CID 79976)

TVA proposes to enter into a 20-year PPA with Silicon Ranch (SR) Russellville LLC (SR Russellville), a subsidiary of Silicon Ranch Corporation (SRC) to purchase the electric power generated by a proposed solar photovoltaic (PV) facility in Logan County, Kentucky. The proposed solar facility would be owned by SRC and operated by SR Russellville and would have an installed capacity of 173 megawatts (MWs). The solar facility would connect to TVA's adjacent existing Springfield-Logan Aluminum 161-kiloVolt Transmission Line. The proposed solar facility would occupy portions of ten individual tracts of land in Logan County, approximately two miles southwest of Russellville, Kentucky, together totaling approximately 1,639 acres (Project Site). The Project Site is within a rural agricultural area. TVA considers the area of potential effects (APE) as the area of proposed ground-disturbance, where physical effects could occur including the silicon PV panels and associated infrastructure including several medium voltage transformers, one or two main power transformers, a substation and battery energy storage system, internal site access roads and all associated cabling and safety equipment. The APE also includes areas within a half-mile radius of the project within which the project would be visible, where visual effects on above-ground resources could occur. In order to obtain maximum flexibility in design to avoid both cultural and environmental resources the archaeological survey area consists of the entire 1,639 acres.

SRC contracted with New South Associates, Inc. to conduct a Phase I Cultural Resources survey. For your review, please find enclosed New South Associates' scope of work (SOW) for the Phase I Cultural Resources survey. Pursuant to 36 CFR § 800.4(b)(1), TVA finds that the SOW presented here represents a reasonable and good faith effort to carry out identification efforts.

By this letter, TVA is initiating consultation regarding the proposed undertaking. TVA is proposing to conduct Phase I Cultural Resources survey of the APE as described in the enclosed SOW.

Mr. Craig Potts
Page 2
April 16, 2021

Pursuant to 36 C.F.R. Part 800.3(f)(2), TVA is initiating consultation with federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the National Register of Historic Places.

Please contact Michaelyn Harle by email, mharle@tva.gov, with your comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Clinton E. Jones". The signature is written in a cursive style with a horizontal line extending to the right.

Clinton E. Jones
Manager
Cultural Compliance

MSH:ABM
Enclosures

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ANDY BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL
THE STATE HISTORIC PRESERVATION OFFICE

MICHAEL E. BERRY
SECRETARY

JACQUELINE COLEMAN
LT. GOVERNOR

410 HIGH STREET
FRANKFORT, KENTUCKY 40601
(502) 564-7005
www.heritage.ky.gov

CRAIG A. POTTS
EXECUTIVE DIRECTOR &
STATE HISTORIC
PRESERVATION OFFICER

May 14, 2021

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

**Re: TVA Power Purchase Agreement, Silicon Ranch, Russellville, Logan County, Kentucky
CID 79976**

Dear Mr. Jones:

Thank you for your email attached information concerning the above-mentioned project, received April 16, 2021. We understand that TVA proposes to enter into a power purchasing agreement with Silicon Ranch Corporation to purchase electricity from a proposed solar generating facility in Russellville, Logan County, Kentucky.

After review of the proposed scope of work, it appears to meet our specifications for conducting fieldwork in Kentucky. We understand from this scope that New South will adjust field methods as necessary to account for the field conditions encountered during survey, and that the proposed methods indicated on the aerial and topographic methods maps assume adequate surface visibility to conduct visual inspection for several of the parcels. We additionally note that New South will be assuming control of some previous survey work conducted by AECOM. This work resulted in the identification of archaeological resources, four of which are indicated as potentially eligible sites. We have not yet commented on AECOM's work, and so are limited in our ability to comment on the proposed treatment of sites identified by AECOM during New South's fieldwork. In general, any site identified only through surface reconnaissance should be subjected to systematic shovel testing to evaluate its subsurface integrity and potential to contain intact cultural features. If, however, some of the sites identified by AECOM were discovered and fully delineated through shovel testing and were recommended as not eligible for the NRHP, then additional work may not be necessary. If this kind of situation exists, please contact us for further consultation. We understand that New South plans to be able to produce a comprehensive report of their survey efforts as well as AECOM's results, as well as complete the registration of sites identified in both survey efforts with the Kentucky Office of State Archaeology.

Based on our review of the proposed APE and methodology for the Architectural (aboveground) survey, we are unclear whether the APE will be sufficient. Larger scale solar projects of this type are relatively new for us to review in Kentucky and, to date, our only APE recommendation has been to use viewshed modeling (with field verification, if necessary) as we have concerns about the visibility of solar installations based on topography (which is different in different parts of the state). Using viewshed modeling may also help limit the amount of survey necessary in some parts of the APE. It would be helpful for us to review a map showing both the direct project area as well as the proposed aboveground APE. Additionally, based on the map, it appears a cemetery may be located within the proposed APE for this project. If the cemetery has an aboveground expression (headstones, walls, etc.) we recommend that it is (at least) documented as an aboveground resource although cemeteries may be documented as both archaeological and aboveground resources.
(Continued on next page.)



An Equal Opportunity Employer

C. Jones
Tennessee Valley Authority
Silicon Ranch Russellville, Logan County, KY
May 14, 2021
Page 2 of 2

We look forward to continuing consultation with you.. Should you have any questions concerning archaeological resources, feel free to contact Chris Gunn of my staff at chris.gunn@ky.gov. Questions concerning above-ground resources can be directed to Jennifer Ryall at jennifer.ryall@ky.gov.

Sincerely,



Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP:cmg, jnr KHC# 61545, 61690



400 West Summit Hill Drive, Knoxville, Tennessee 37902

April 19, 2021

Mr. Paul Barton
Tribal Historic Preservation Officer
Eastern Shawnee Tribe of Oklahoma

[REDACTED]

Ms. Tonya Tipton
Tribal Historic Preservation Officer
Shawnee Tribe

[REDACTED]

Ms. Devon Frazier
Tribal Historic Preservation Officer
Absentee Shawnee Tribe of Indians of
Oklahoma

[REDACTED]

Ms. Elizabeth Toombs
Tribal Historic Preservation Officer
Cherokee Nation

[REDACTED]

Dr. Andrea Hunter
Director and Tribal Historic Preservation
Officer
Osage Nation Historic Preservation Office

[REDACTED]

Ms. Whitney Warrior
Director of Historic Preservation
United Keetoowah Band of Cherokee
Indians in Oklahoma

[REDACTED]

Mr. Logan Pappenfort
Director of Cultural Preservation
Peoria Tribe of Indians of Oklahoma

[REDACTED]

Mr. Stephen Yerka
Historic Preservation Specialist
Tribal Historic Preservation Office
Eastern Band of Cherokee Indians

[REDACTED]

Dear Sir or Madam:

TENNESSEE VALLEY AUTHORITY (TVA), INITIATION OF CONSULTATION, POWER PURCHASE AGREEMENT (PPA), RUSSELLVILLE, LOGAN COUNTY, KENTUCKY (36.765588, -86.975550) (TVA TRACKING NUMBER – CID 79976)

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Sir/Madam
Page 2
April 19, 2021

the area of potential effects (APE) as the area of proposed ground-disturbance, where physical effects could occur including the silicon PV panels and associated infrastructure including several medium voltage transformers, one or two main power transformers, a substation and battery energy storage system, internal site access roads and all associated cabling and safety equipment. The APE also includes areas within a half-mile radius of the project within which the project would be visible, where visual effects on above-ground resources could occur. In order to obtain maximum flexibility in design to avoid both cultural and environmental resources the archaeological survey area consists of the entire 1,639 acres.

SRC contracted with New South Associates, Inc. to conduct a Phase I Cultural Resources survey. For your review, please find enclosed New South Associates' scope of work (SOW) for the Phase I Cultural Resources survey. Pursuant to 36 CFR § 800.4(b)(1), TVA finds that the SOW presented here represents a reasonable and good faith effort to carry out identification efforts.

By this letter, TVA is initiating consultation regarding the proposed undertaking. TVA is proposing to conduct Phase I Cultural Resources survey of the APE as described in the enclosed SOW.

TVA is consulting with Absentee Shawnee Tribe of Indians of Oklahoma, Cherokee Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Osage Nation, Peoria Tribe of Oklahoma, Shawnee Tribe, and United Keetoowah Band of Cherokee Indians in Oklahoma.

Please respond by May 19, 2021 if possible regarding any comments on the proposed undertaking or the proposed Phase I survey. If you have any questions, please contact me by phone, (865) 253-1265 or by e-mail, mmshuler@tva.gov.

Sincerely,



Marianne Shuler
Senior Specialist, Archaeologist, and Tribal Liaison
Cultural Compliance

Sir/Madam
Page 3
April 19, 2021

MSH:ABM

Enclosures

cc (Enclosures):

Ms. Sheila Bird
Cultural Preservation Consultant
Shawnee Tribe

[REDACTED]

Ms. Erica Gorsuch
Assistant THPO/Section 106 Coordinator
United Keetoowah Band of Cherokee Indians in Oklahoma

[REDACTED]

Ms. Courtney Neff
Section 106 Assistant
Osage Nation Historic Preservation Office

[REDACTED]

Mr. Russell Townsend
Tribal Historic Preservation Officer
Eastern Band of Cherokee Indians

[REDACTED]

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G W Y A D B F
CHEROKEE NATION[®]
P.O. Box 948 • Tahlequah, OK 74465-0948
918-453-5000 • www.cherokee.org

Office of the Chief

Chuck Hoskin Jr.
Principal Chief

Bryan Warner
Deputy Principal Chief

May 19, 2021

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

Re: CID 79976, Proposed Power Purchase Agreement with Silicon Ranch Russellville

Ms. Marianne Shuler:

The Cherokee Nation (Nation) is in receipt of your correspondence about **CID 79976**, and appreciates the opportunity to provide comment upon this project. Please allow this letter to serve as the Nation's interest in acting as a consulting party to this proposed project.

The Nation maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found instances where this project intersects or adjoins such resources.

Thus, the Nation recommends that a cultural resources survey is conducted for this project, and requests a copy of the related report. The Nation requires that cultural resources survey personnel and reports meet the Secretary of Interior's standards and guidelines.

However, the Nation requests that the Tennessee Valley Authority (TVA) halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this survey.

Additionally, the Nation requests that TVA conduct appropriate inquiries with other pertinent Tribal and Historic Preservation Offices regarding historic and prehistoric resources not included in the Nation's databases or records.

CID 79976
May 19, 2021
Page 2 of 2

If you require additional information or have any questions, please contact me at your convenience.
Thank you for your time and attention to this matter.

Wado,



Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation Tribal Historic Preservation Office

[Redacted]
[Redacted]

Placed by
Once a Day

(Window)

(Window)

(Window)

Fireplace
Now Covered

Bed Room

Now Bookcase

HISTORIC ARCHITECTURE SURVEY
AND
ASSESSMENT OF EFFECTS
FOR THE
PROPOSED RUSSELLVILLE SOLAR FARM

LOGAN COUNTY, KENTUCKY

(Doorway)

(Double Window)

Window



HISTORIC ARCHITECTURE SURVEY AND ASSESSMENT OF EFFECTS FOR THE PROPOSED LOGAN COUNTY SOLAR PROJECT

Logan County, Kentucky

Report submitted to:

HDR • 440 South Church Street • Suite 1000 • Charlotte, North Carolina 28202-2075

Report prepared by:

New South Associates, Inc. • 1629 Fatherland Street • Nashville, Tennessee 37206

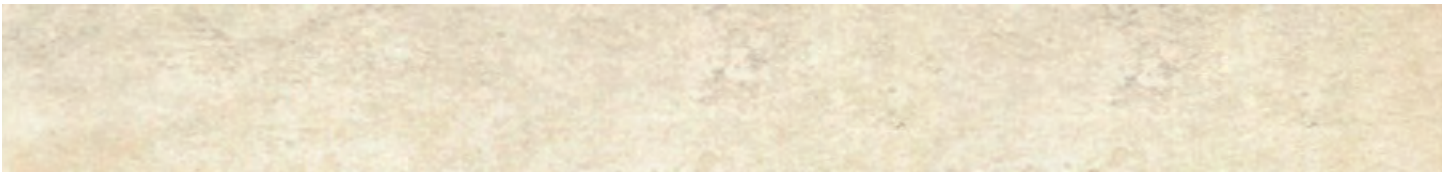


A handwritten signature in black ink that reads "Robbie D. Jones". The signature is written in a cursive style with a large, stylized "J" at the end.

Robbie D. Jones – Project Manager

Sydney Schoof – Architectural Historian and Co-Author
Paul Hoffman – Architectural Historian and Co-Author
Robbie D. Jones – Senior Architectural Historian and Co-Author

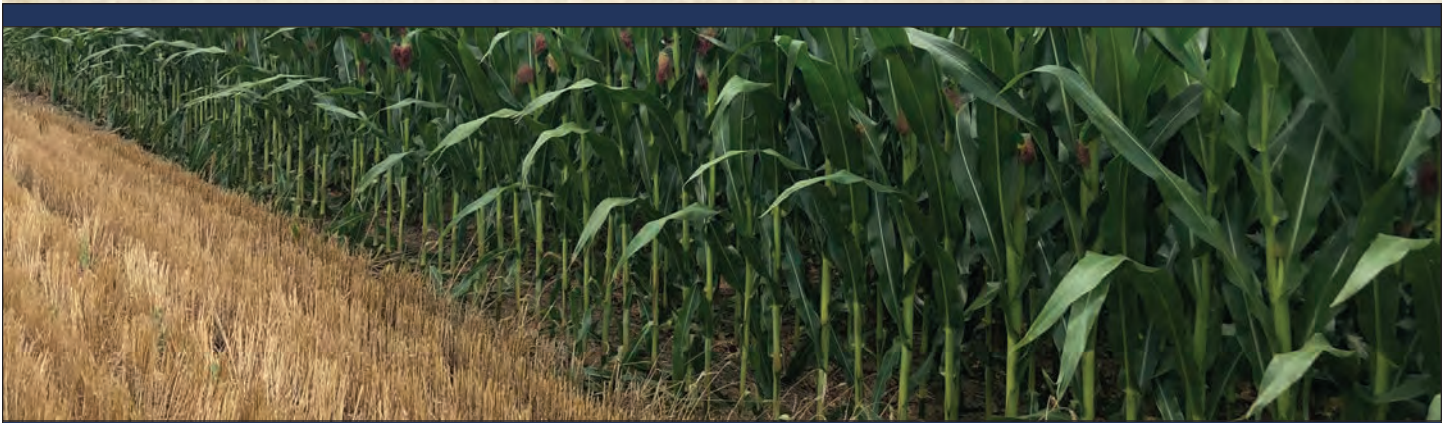
March 29, 2022 • **Draft Report**
New South Associates Technical Report 4214



PHASE I CULTURAL RESOURCE SURVEY
1,585 ACRES FOR THE RUSSELLVILLE SOLAR FARM

LOGAN COUNTY, KENTUCKY

NEW SOUTH ASSOCIATES, INC.



Phase I Cultural Resource Survey (1,585 Acres) for the Russellville Solar Farm

Logan County, Kentucky

Subconsultant Agreement 10297497

Report submitted to:

HDR Engineering • 750 Old Hickory Boulevard, Building 1, Suite 200 • Nashville, Tennessee 37027

Report prepared by:

New South Associates, Inc. • 6150 East Ponce de Leon Avenue • Stone Mountain, Georgia 30083



Danny Gregory, MA, RPA – Principal Investigator

Lori C. Thompson, MA, RPA – Archaeologist and Author

Ashley Cavanaugh – Archaeologist and Co-Author

Brian Cavanaugh – Archaeologist and Co-Author

Sydney Schoof – Architectural Historian and Co-Author

Paul Hoffman – Architectural Historian and Co-Author

Robbie D. Jones – Senior Architectural Historian and Co-Author

February 16, 2022 • **Revised Draft Report**
New South Associates Technical Report 4248

Appendix E – Public Notice

INVITATION FOR PUBLIC COMMENT

Logan County Solar Project

The Tennessee Valley Authority (TVA) is asking the public to provide input on a draft Environmental Assessment (EA) for the Logan County Solar Project in Logan County, Kentucky. Details of the review are available in a draft Environmental Assessment at www.tva.com/nepa.

TVA has entered into a power purchase agreement (PPA) with Russellville Solar LLC, a wholly owned subsidiary of Silicon Ranch Corporation, to purchase the power generated by the proposed Logan County Solar Project in Logan County, Kentucky. The project is anticipated to generate up to 173 megawatts (MW) alternating current (AC) in capacity. The proposed solar facility would be constructed and operated by Russellville Solar LLC.

The draft EA includes two alternatives: a No Action Alternative and an Action Alternative. Under the No Action Alternative, TVA would not purchase the power generated by the project under the 20-year PPA with Russellville Solar LLC, and TVA would not be involved with the project. Under the Proposed Action Alternative, Russellville Solar LLC would construct and operate a 173-MW AC single-axis tracking photovoltaic (PV) solar power facility with a 30-MW Battery Energy Storage System (BESS). The proposed project would be developed on 1,088 acres of a 1,569-acre project site located approximately 2 miles southwest of the city of Russellville in Logan County, Kentucky. TVA's connection to the new solar facility would occur at the existing Springfield-Logan Aluminum 161-kV TL via a proposed substation and switching station in the northeastern portion of the solar facility site. The entire 173-MW output from the solar facility would be sold to TVA under the terms of the PPA.

The complete draft Environmental Assessment is available at www.tva.com/nepa.

Submitting Comments

TVA invites you to comment on the draft EA. Comments must be received or postmarked no later than **May 3, 2022**. Electronic comment submittals are preferred. Any comments received, including names and addresses, will become part of the administrative record and will be available for public inspection.

Written comments should be sent to:

Tennessee Valley Authority

ATTN: Elizabeth Smith, NEPA Specialist

400 W. Summit Hill Drive, WT-11D, Knoxville, TN 37902

Email comments here: nepa@tva.gov

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