Document Type: EA-Administrative Record
Index Field: Environmental Assessment
Project Name: Brown Swiss Solar Project
Project Number: 2015-3

BROWN SWISS SOLAR FACILITIES

Greene County, Tennessee

DRAFT
ENVIRONMENTAL ASSESSMENT

Prepared for:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

Submitted by:
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January 2015

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Symbols, Acronyms, and Abbreviations

AC	Alternating current
APE	Area of Potential Effects
BMP	Best management practice
CFR	Code of Federal Register
dB	Decibel
dBA	A-weighted decibel
dbh	Diameter at breast height
DC	Direct current
DNL	Day-night sound level
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
GHG	Greenhouse gas
IPaC	Information, Planning, and Conservation System
IRP	Integrated Resource Plan
kV	Kilovolts
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PPA	Power purchase agreement
PV	Photovoltaic
ROW	Right-of-way
RSO	Renewable Standard Offer
SGHAT	Solar Glare Hazard Analysis Tool
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environmental Conservation
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish And Wildlife Service

CHAPTER 1 – INTRODUCTION

The Tennessee Valley Authority (TVA) proposes to enter into two power purchase agreements (PPAs) with Brown Swiss Holdings, LLC, a subsidiary of Birdseye Renewable Energy, for electricity generated by Brown Swiss's two proposed adjacent solar facilities in Chuckey, Greene County, Tennessee (Figures 1, 2). Each would have a generating capacity of 10 megawatts (MW) direct current (DC) for a total capacity of 20 MW DC. The PPAs would be executed through TVA's Renewable Standard Offer (RSO) program, under which TVA agrees to purchase qualifying renewable energy at set prices for a 20-year period.

The Brown Swiss solar facilities and associated electrical interconnection would occupy approximately 130 acres. The facilities would consist of multiple parallel rows of photovoltaic (PV) panels fastened to fixed metal racks, DC to alternating current (AC) inverters, and transformers. A new 24 kilovolt (kV) transmission line approximately 2,300 feet long would connect the solar facilities to a new electrical substation near TVA's existing Tusculum-Washington College 69-kV transmission line. A short 69-kV transmission line would connect the substation to the Tusculum-Washington College line.

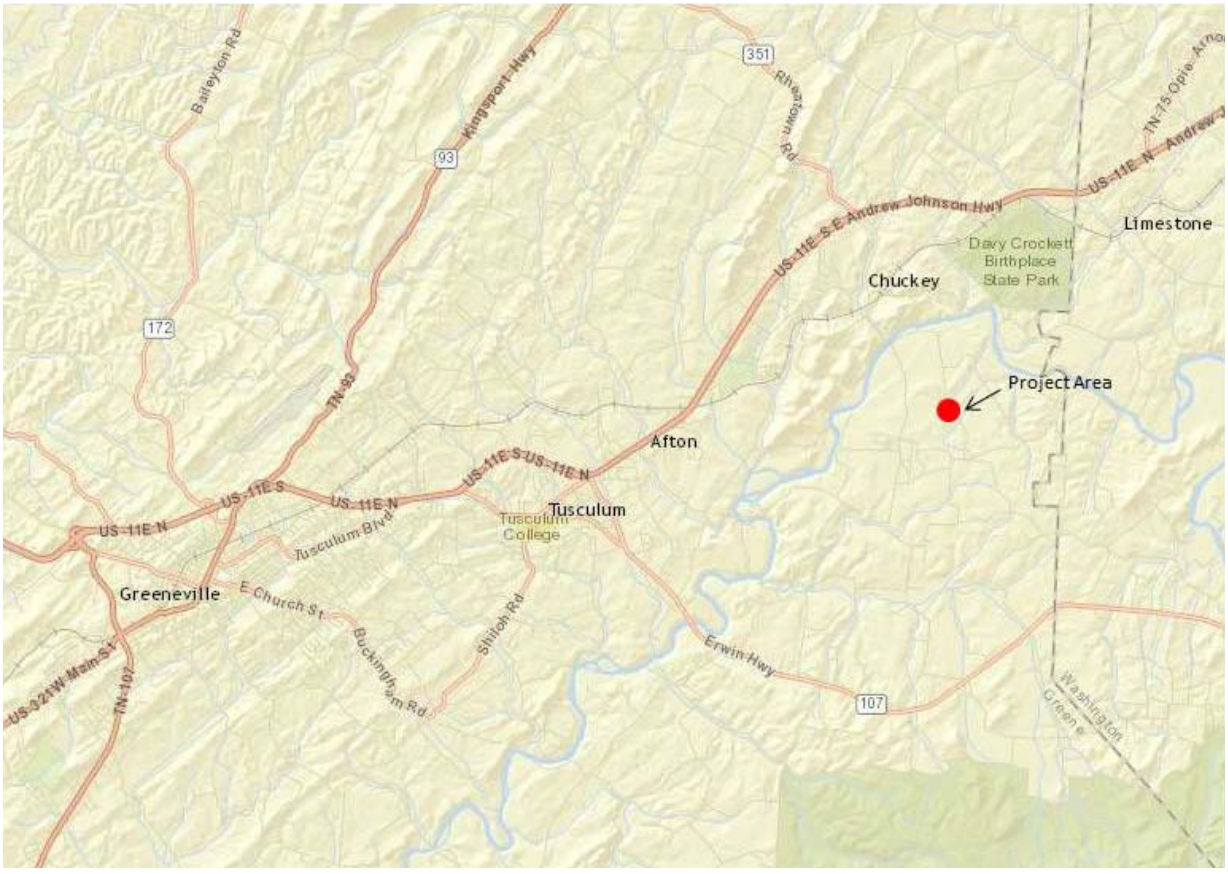

Figure 1. Location of Brown Swiss solar facilities in Chuckey, Tennessee.

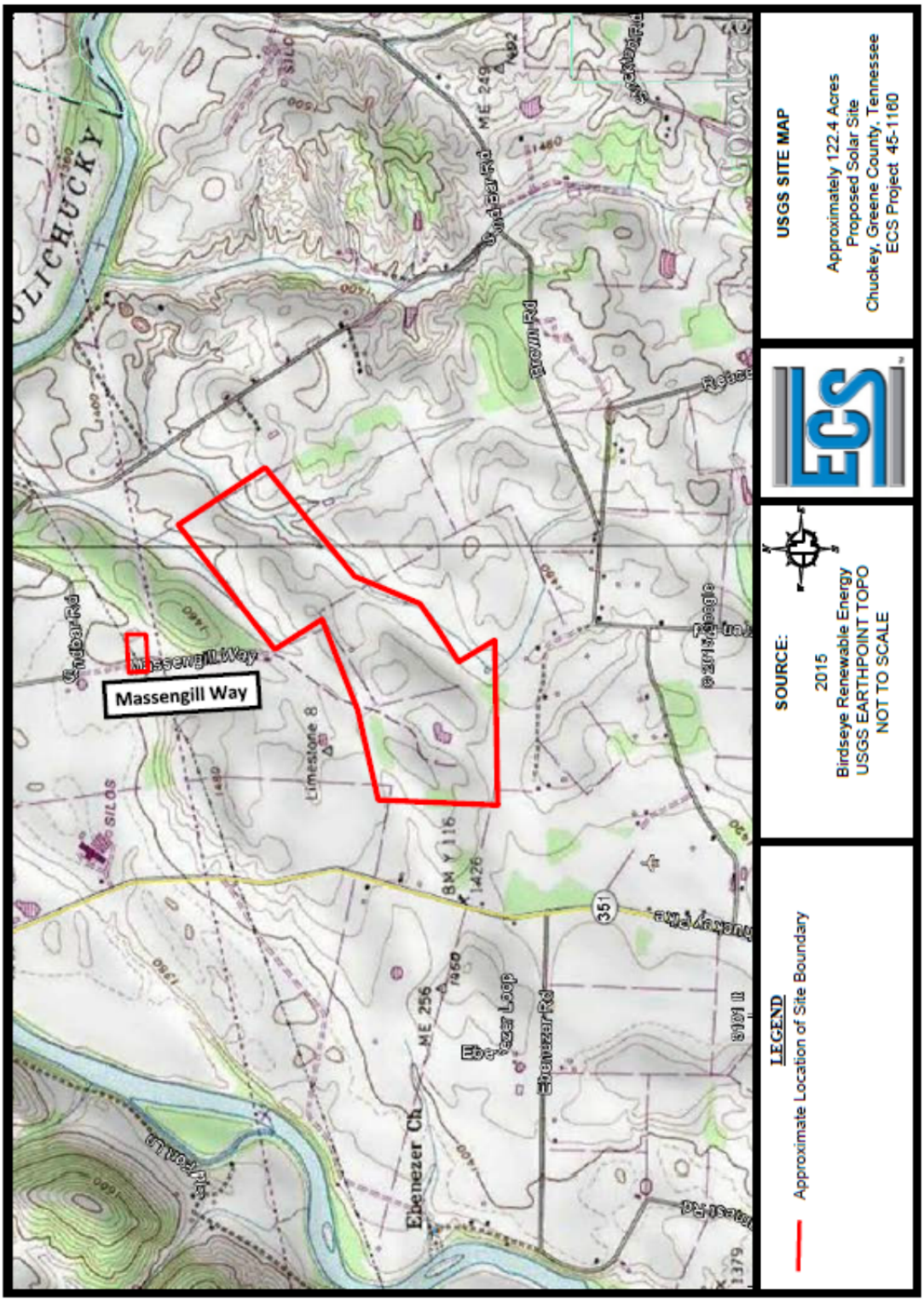

Figure 2. Brown Swiss solar facilities project area map.

1.1 Purpose and Need for Action

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

TVA produces or obtains electricity from a diverse portfolio of energy sources including nuclear, fossil, hydro, solar, wind, and biomass. In 2011, TVA completed an Integrated Resource Plan (IRP) and associated Environmental Impact Statement (EIS) (TVA 2011). The IRP identifies the resources that TVA uses to meet the energy needs of the TVA region over the 20-year planning period while meeting TVA's vision to become one of the nation's leading providers of low-cost and cleaner energy by 2020. Cost-effective renewable energy, including energy generated by solar PV, is one of the energy resources recommended in the IRP. The RSO program was established as one of the mechanisms used by TVA to increase its use of renewable energy, including energy generated by solar photovoltaic (PV) facilities such as the proposed Brown Swiss facilities. In July 2015, TVA issued an updated final IRP and associated final supplemental EIS (TVA 2015). The proposed PPAs with Brown Swiss are consistent with the alternative strategies evaluated in the 2015 IRP and the planning direction approved by the TVA Board of Directors in August 2015.

1.2 Scoping and Public Involvement

Pursuant to the National Environmental Policy Act of 1969 (NEPA) and the Act's implementing regulations promulgated by the Council on Environmental Quality (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) has been prepared to assess the potential consequences of TVA's Proposed Action (the purchase of power under the two PPAs) on the environment in accordance with NEPA and TVA's procedures for implementing NEPA (TVA 1983).

TVA's Proposed Action would result in the construction and operation of the two proposed solar facilities by Brown-Swiss, LLC, as well as actions taken by TVA to connect the solar facilities to the TVA transmission system. The scope of this EA therefore focuses on impacts related to the construction and operation of the proposed solar facilities and associated modifications to the TVA transmission system. It describes the existing environment at the project site and analyzes potential environmental impacts associated with the Proposed Action and the No Action Alternative.

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

This draft EA is being issued for public review and comment. TVA will carefully review any comments received on this draft EA and address them, as appropriate, in the final EA.

Through the process of internal scoping and a review of applicable laws and regulations, TVA has identified the following resource areas for analysis in the EA due to the potential for impacts:

- Visual Resources
- Land Use
- Geology and Soils
- Hydrology and Water Quality
- Floodplains
- Wetlands
- Biological Resources
- Air Quality
- Noise
- Transportation
- Cultural Resources
- Socioeconomics and Environmental Justice
- Solid and Hazardous Waste

TVA also considered potential effects related to public and occupational health and safety, recreation, and parks and natural areas. However, TVA found these potential effects to be absent or minor and to not require further evaluation.

This draft EA is being issued for public review and comment. TVA will carefully review any comments received on this draft EA and address them, as appropriate, in the final EA.

1.3 Permits and Approvals

A National Pollution Discharge Elimination System (NPDES) permit for the discharge of stormwater from construction activities associated with this project would be obtained from the Tennessee Department of Environment and Conservation (TDEC). As part of the application process for this permit, Brown Swiss will prepare and submit a Notice of Intent and a site-specific Stormwater Pollution Prevention Plan (SWPPP) to TDEC before initiating construction activities. Brown Swiss has received the necessary zoning approval from the Greene County Planning Commission. Local building permits may be required.

CHAPTER 2 – ALTERNATIVES

This chapter explains the rationale for selecting the alternatives to be evaluated, describes each alternative, provides a comparison of the potential environmental impact of those alternatives, and identifies the preferred alternative.

2.1 Description of Alternatives

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

2.1.1 Alternative A – The No Action Alternative

The No Action Alternative provides for a baseline of conditions against which the impacts of the Proposed Action Alternative can be measured. Under this alternative, TVA would not purchase the power generated by the proposed solar facilities under the 20-year PPAs with Brown Swiss. Brown Swiss would not construct and operate the two solar facilities and TVA would not connect them to its transmission system. There would be no project-related changes to land use, natural resources, or socioeconomics in the immediate future and the project area could continue to be farmed or developed for other purposes. TVA would continue to rely on other sources of generation described in the 2015 IRP (TVA 2015) to ensure an adequate energy supply and to meet its goals for increased renewable and low-GHG emitting generation.

Environmental conditions in the project area would remain unchanged in the immediate future.

2.1.2 Alternative B, Proposed Action Alternative

Under the Proposed Action Alternative, TVA would enter into the two 20-year PPAs with Brown Swiss, and Brown Swiss would construct and operate the two adjacent 10-MW PV solar power facilities. The solar facilities would occupy an approximately 122.4-acre project area in the Chuckey community in eastern Greene County, Tennessee (Figures 1, 2, and 3). Facility components include the PV arrays, electrical connections, power inverters and transformers, an electrical substation, and a transmission line connecting the solar facility and substation to the TVA 69-kV Tusculum-Washington College transmission line located about 1,500 feet north of the solar facilities.

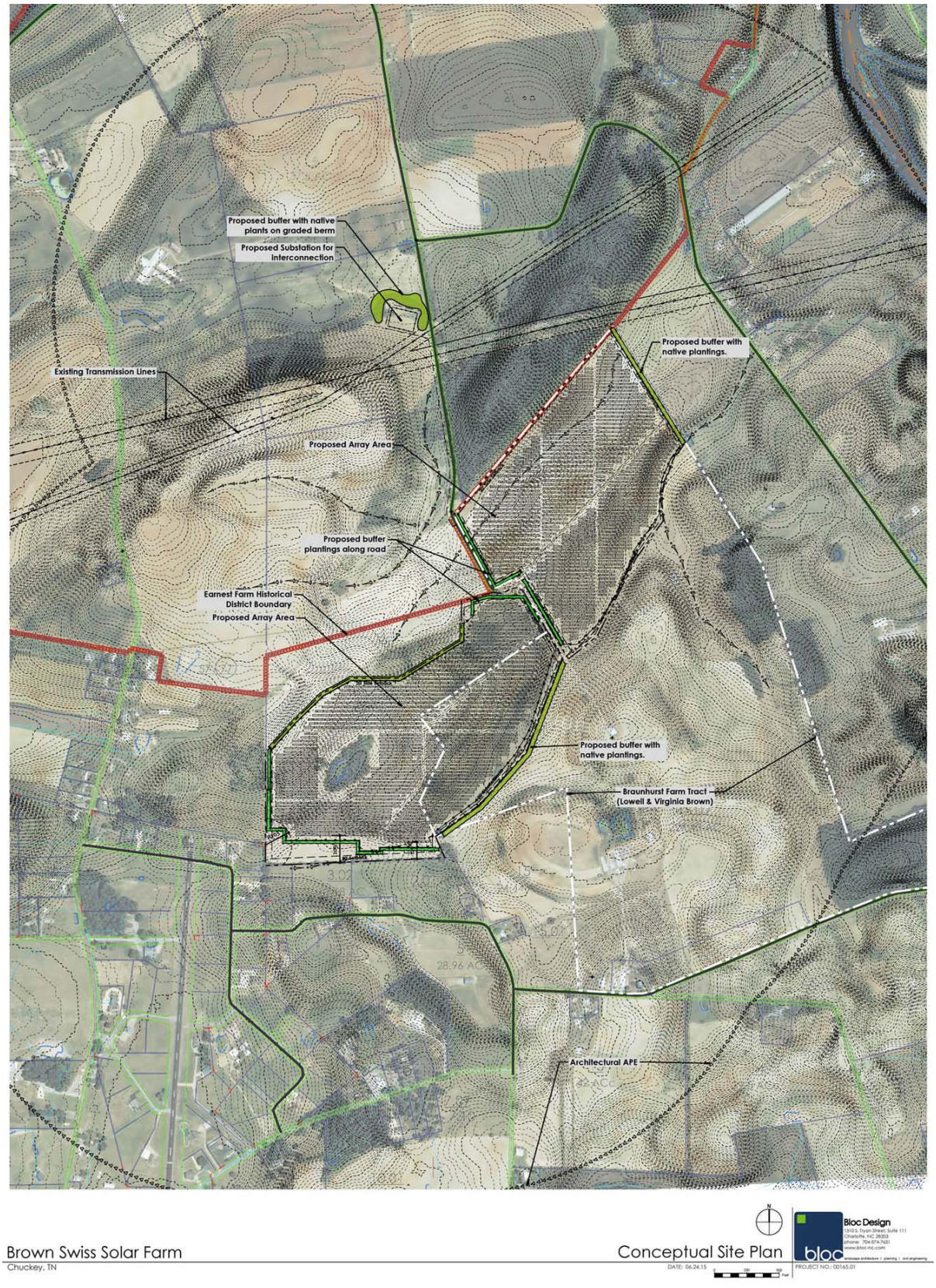

Figure 3. Conceptual site plan for Brown Swiss solar facilities.

Solar Facilities

At the start of construction, the solar facility sites would be mowed and tall vegetation removed. Permanent access roads connecting to Massengill Way would be constructed and run northeast across the northern solar site and southwest across the southern solar site. These roads would be cleared of vegetation, graded as necessary, and covered with gravel added as necessary to facilitate reliable transport of materials through the sites. The solar sites would be lightly graded to smooth the ground surface to facilitate the installation and operation of the PV arrays as needed. Cut and fill volumes would be balanced on the site. The PV arrays would be installed in multiple parallel east-west rows. The arrays would consist of PV panels (modules), each typically capable of producing about 310 to 320 watts, mounted on fixed-tilt metal racks. The PV panels would be oriented due south and tilted at an angle of 20 degrees.

The PV modules would be electrically connected in series by wire harnesses attached to the metal panel racks. The rows of PV modules would be connected by electrical cables installed in trenches to ten DC to alternating current (AC) power inverters installed on concrete pads. These would be connected by buried electrical cables to a transformer and a metering box at both the north and south solar facilities. The inverters and transformers would be installed on concrete pads with dimensions of approximately 20 feet by 10 feet.

The site would be enclosed by a six foot chain-link fence topped with three strands of barbed wire. Once the facility is operating, vegetation on the site would be actively maintained to control growth and prevent shading of the PV panels. The primary method of vegetation control would be with lawnmowers, and weed eaters. Herbicides may also be applied around structures to control vegetation. All herbicides would be applied by licensed applicators in accordance with applicable state and federal laws and regulations.

Electrical Interconnection

The electrical interconnection between the solar facilities and the TVA transmission system includes a new substation, a 24-kilovolt (kV) transmission line connecting the substation to the solar facilities, a transmission line connecting the substation to the TVA Tusculum-Washington College transmission line, and a new switch structure at the connection point on the Tusculum-Washington College transmission line. The new substation to be constructed by Brown Swiss would be located north of the solar facility sites and adjacent to the Tusculum-Washington College transmission line (Figure 4). The substation components include buses, circuit breakers, motor-operated and manually operated switches, electrical meters, a control enclosure, and the main step-up transformer. The control enclosure would house the protection and control equipment, metering equipment, relay panels, and communication equipment. The substation would occupy 1 to 2 acres and be enclosed by security fencing. In order to reduce the visual impacts of the substation, Brown Swiss would construct an elevated earthen berm around its west, north, and east sides and plant native trees and shrubs on this berm. The final configuration of the substation would be determined as design of the switching station and connecting transmission line is finalized by TVA.

Galvanized steel would support most of the substation equipment. Above-ground and below-ground conduits from this equipment would run to the control enclosure. A station service transformer would be installed for auxiliary AC power requirements. Battery banks and chargers would be installed inside the enclosure to provide backup DC power to the switching station. For personnel safety and equipment protection during faulted

conditions, a ground grid would be installed in the switching station/substation areas. This would consist of appropriately sized conductors meshed and buried below ground. Each piece of equipment and supporting structure within the substation would be electrically connected to the ground grid per the requirements of Institute of Electrical and Electronics Engineers Standard 80.

To connect the solar facilities to the new substation, Brown Swiss would construct an approximately 2,300 foot long, 24-kV dual circuit power and communications line along Massengill Way. Much of this would be constructed by replacing existing power poles with new 50-foot tall poles that support not only the new electrical conductors and communication lines, but also the relocated existing lower voltage electrical lines.

Under the Proposed Action, TVA would construct a short 69-kV transmission line to connect the Brown Swiss substation to TVA's nearby Tusculum-Washington College transmission line. While the exact location of the transmission line route has not yet been finalized, preliminary engineering indicates it would likely connect the Brown Swiss 69-kV Substation to the Tusculum-Washington College line between structures 140 and 141 located as shown in Figure 4. The new line would be approximately 2300 feet in length, and would be constructed on a 100-foot wide right-of-way (ROW). To facilitate the operation of the proposed site and transmission line connection, TVA proposes to undertake the following additional activities:

- Install telecommunications connections at the Brown Swiss, Tennessee 46-kV and Tusculum, Tennessee 161-kV, and Volunteer, Tennessee 500-kV substations
- Modify the TVA system map boards to include names and numbers of the new transmission line and Brown Swiss Substation.

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

Because the area in which the proposed transmission line would be built is predominantly cropland, limited clearing would be required. In areas where clearing is needed to maintain adequate clearance between tall vegetation and transmission line conductors and to provide access for construction equipment, trees and shrubs would be removed from the ROW. Equipment used during this ROW clearing could include chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Woody debris and other vegetation would be piled and burned, chipped, or taken off site. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential to soon grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote-handling equipment,

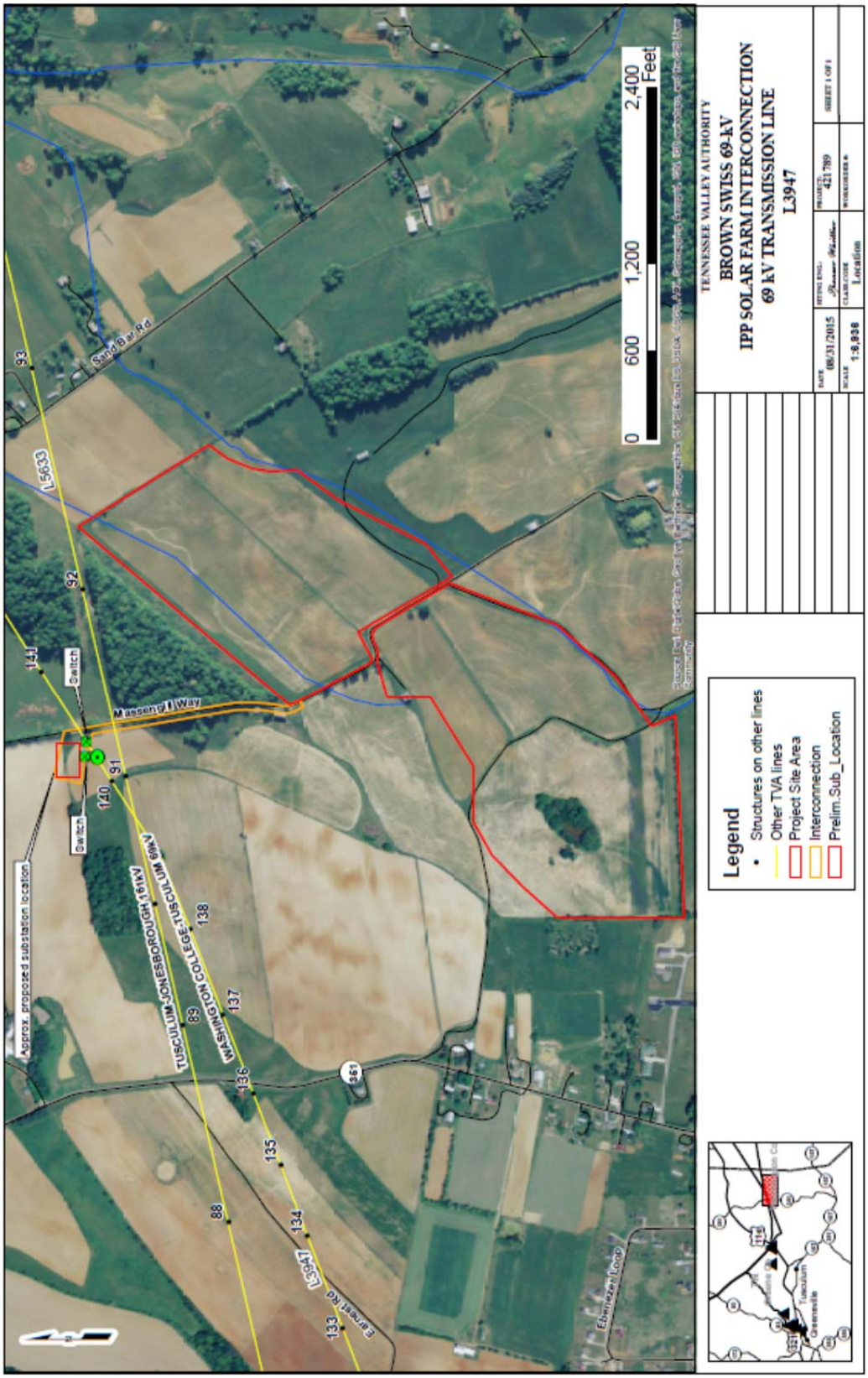

Figure 4. Components of the interconnection to the TVA transmission system.

such as a feller-buncher, in order to limit ground disturbance. TVA ROW Clearing Specifications (TVA 2013a), Environmental Quality Protection Specifications for Transmission Line Construction (TVA 2013b), Transmission Construction Guidelines Near Streams (TVA 2012a), and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities (TVA 2012b) would provide guidance for clearing and construction activities.

Following clearing and construction, vegetative cover on the ROW would be restored to its condition prior to construction, to the extent practicable, utilizing appropriate seed mixtures as described in TVA (2012b), or in working with the property owner to establish desired crop cover. Erosion controls would remain in place until the plant communities become fully established. Streamside areas would be revegetated as described in TVA (2012a), TVA (2012b), TVA (2013a), and TVA (2013b). Native vegetation or plants with favorable growth patterns (slow growth and low mature heights) would be maintained within the ROW following construction.

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

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

A new switch structure would be installed on the Tusculum-Washington College transmission line, likely between structures 140 and 141. The switch structure would be a steel monopole about 60 feet tall supported by guy wires. The electrical conductors on the Tusculum-Washington College line and the new line to the substation would be connected to switches located on three horizontal arms of the switch structure. Structures 140 and 141 may require in-class replacement depending on further engineering analysis. Three conductors (the cables that carry the electrical current) are required to make up a single-circuit alternating-current transmission line. For a 69-kV transmission line, each single cable conductor is attached to porcelain insulators suspended from the structure cross arms. A smaller overhead ground wire or wire containing fiber optic communication cables, are attached to the top of the structures.

Most poles are directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. Normally, the holes would be backfilled with the excavated material, but, in some cases, gravel or a concrete-and-gravel

mixture would be used. Poles at angles (angle points) in the transmission line may require supporting screw, rock, or log-anchored guys or may be may be self-supporting poles.

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

Reels of conductor and OPGW would be delivered to the site. A small rope would be pulled from structure to structure. It would be connected to the conductor and OPGW and used to pull them down the line through pulleys suspended from the insulators from pull-points along the ROW. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

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

TVA vegetation management standards, based on National Electric Safety Code requirements, require a minimum vegetation clearance of 22 feet for 69-kV transmission lines. Vegetation management along the ROW would consist of the felling of danger trees adjacent to the cleared ROW (as described above) and vegetation control within the cleared ROW. These activities occur on approximately 3- to 5-year cycles. TVA utilizes an integrated management approach for its ROW vegetation management that is designed to encourage low-growing plant species and discourage tall-growing plant species. A vegetation reclearing plan is developed for the transmission line, based on the results of the periodic inspections described above. The two principal management techniques are mechanical mowing (using tractor-mounted rotary mowers) and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied by helicopter or from the ground with backpack sprayers or vehicle-mounted sprayers. Provided the current agricultural land use continues, little ROW maintenance would be required in the future.

Any herbicides used are applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the United States Environmental Protection Agency (USEPA) are used. A list of the herbicides currently used by TVA in ROW management is presented in TVA (2013c). This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

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

2.1.3 Alternatives Considered but Eliminated From Further Discussion

Siting requirements for a 20-MW solar energy generating facility, such as the one proposed by Birdseye, include availability of a contiguous area of at least 125 acres that is relatively level and preferably cleared, proximity to an existing transmission line and/or substation capable of receiving the energy generated by the facility, favorable topography, and an adequate solar resource (i.e., adequate sunshine). Additional siting criteria include one or few willing landowners, a properly zoned site, and adjacent landowners that are receptive to the proposed development. In addition to the proposed site, Birdseye evaluated three additional sites. These sites, and the reasons they were determined to not be feasible, are:

- Phipps Bend in Hawkins County, determined not feasible due to its small size and transmission system constraints
- Near Mooresburg in Hawkins County, determined not feasible due to transmission system constraints
- At Chuckey, a short distance north of the proposed site. This site was determined not feasible because all of the proposed facility would have been within the Earnest Farms Historic District, and would have far greater adverse impacts on this historic property.

Given the lack of feasible alternative sites, the analyses in this EA focus on the proposed site and facility as described above for Alternative B.

2.2 Comparison of Alternatives

The summary and comparison of impacts by alternative for each resource area evaluated is provided in Table 1.

Table 1. Summary and comparison of alternatives by resource area.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Visual Resources	No impacts anticipated	Minor adverse impacts. Vegetative screening would shield many PV arrays, others would remain visible, particularly at middle-ground distances.
Land Use	No impacts anticipated	Minor adverse impacts. Land use of the site would change from agricultural to light industrial. No change to surrounding land uses.
Geology, Soils, and Prime Farmland	No impacts anticipated	No impacts to area geology. Minor adverse impacts to soils during construction. Minor adverse impacts to prime farmland due to removal of solar facilities site from agricultural production.
Hydrology and Water Quality	No impacts anticipated	No direct effects on surface waters. Minor indirect effects with use of best management practices.
Floodplains and Wetlands	No impacts anticipated	No impacts anticipated
Biological Resources	No impacts anticipated	Minor impacts to vegetation and wildlife on project site. Insignificant impacts to endangered and threatened species with implementation of mitigation measures.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Air Quality & Greenhouse Gas Emissions	No impacts anticipated	Negligible temporary direct impacts during construction activities. Minor beneficial impacts from operation due to reduced emissions from fossil-fueled generation.
Noise	No impacts anticipated	Minor temporary impacts during construction. Negligible adverse impacts from mowing during system operations.
Transportation	No impacts anticipated	Minor temporary impacts from increased roadway traffic during construction. Low potential for impacts to aircraft operation from glare during operation.
Cultural Resources	No impacts anticipated	Adverse effects to Earnest Farms Historic District and historic Braunhurst Farm mitigated per terms of memorandum of agreement.
Socioeconomics and Environmental Justice	No impacts anticipated	Minor beneficial impacts during construction and operation and maintenance activities by creation of local jobs and an increase in local tax base from an increase in assessed property value. No disproportionate adverse impacts to minority or low-income populations.
Solid and Hazardous Waste	No impacts anticipated	Insignificant impacts with recycling and proper disposal of construction materials. No hazardous waste generated.

2.3 Mitigation Measures

Birdseye Energy would comply with the terms of the stormwater pollution prevention plan prepared as part of the stormwater discharge permitting process and implement other routine best management practices. TVA would similarly implement routine BMPs during its construction and operation of the transmission interconnection. Birdseye would also implement the following measure to mitigate the visual impacts of the proposed solar facilities:

1. Construct a visual screen around portions of the substation and solar facilities as illustrated in Figure 3. The visual screen around the substation would consist of a raised earthen berm planted with native trees and shrubs in multiple rows. The visual screen around the solar facilities would consist of native trees and shrubs planted in multiple rows.

Birdseye and TVA would implement the following measures to mitigate the adverse effects of the solar facilities and transmission interconnection on historic properties:

2. In coordination the Tennessee State Historic Preservation Office, update the National Register of Historic Properties registration form for the Earnest Farms Historic District to include observations and data generated during the recent survey undertaken for the proposed solar facilities.

3. Develop an educational driving tour pamphlet or brochure describing the Earnest Farms, Braunhurst Farm, and other historical sites in the area. The brochure would be made available to the public at appropriate area locations.

2.4 The Preferred Alternative

The TVA-preferred alternative is the Proposed Action Alternative, resulting in the construction and operation of the two adjacent 10-MW PV solar power facilities. The Proposed Action Alternative would produce renewable energy for TVA and its customers with only minor direct and indirect environmental impacts, would help meet TVA's renewable energy goals, and would help TVA meet future energy demands on the TVA system.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

3.1 Visual Resources

This section provides an overview and details of the existing land use at and surrounding the project site, as well as the potential impacts on land use that would be associated with the alternatives.

3.1.1 Affected Environment

The project area is rural and primarily farmland characterized by gently rolling terrain. A ridge with a maximum relief of about 95 feet runs southwest-northeast across the two solar facility sites. Except for a small wooded area surrounding a small pond on the southern solar facility site, the project area is actively farmed. The major annual crops observed in the area are soybeans and tobacco. No farm buildings or other structures are present on the solar farm sites, although a few farm buildings do occur on the periphery of the site. The overall appearance is of gently rolling farmland with a few scattered trees with few man-made buildings or other items (Figures 5, 6).

Figure 5. Winter view of the project area facing southeast.

Figure 6. Winter view of project area facing west from the gravel road separating the north and south solar farm sites.

A wooded ridge runs southwest-northeast adjacent to and just north of the northern border of the north solar farm site (Figures 2–4). Most of the remainder of the two solar farm sites is surrounded by similar farmland. The southwest corner of the south solar farm site is adjacent to the Hensley Airpark aviation community (http://www.hensleyairpark.com) consisting of private residences on 1- to 2.5-acre lots surrounding a 3,000-foot paved runway and a shorter grass runway. A paved road, Massengill Way, enters the project area from the north, passes just east of the proposed substation site, and then along the interconnection power line route to the northwest corner of the northern solar farm site. At that point it becomes a private gravel farm road that runs along the west edge of the northern solar farm site and then between the northern and southern solar farm sites. Other public roads surrounding the solar farm sites are at least 500 feet from the proposed PV arrays. Scattered rural residences and farm buildings occur along these roads. Chuckey Pike (State Route 351), the major highway through the area, runs north-south about 1,100 feet west of the southern solar farm site. Portions of the solar farm site are visible from points along Chuckey Pike, parts of Hensley Airpark, Barren Road and the western portion of Brown Road south of the southern solar farm site, and parts of Sandbar Road east of the northern solar farm site (Figure 7).

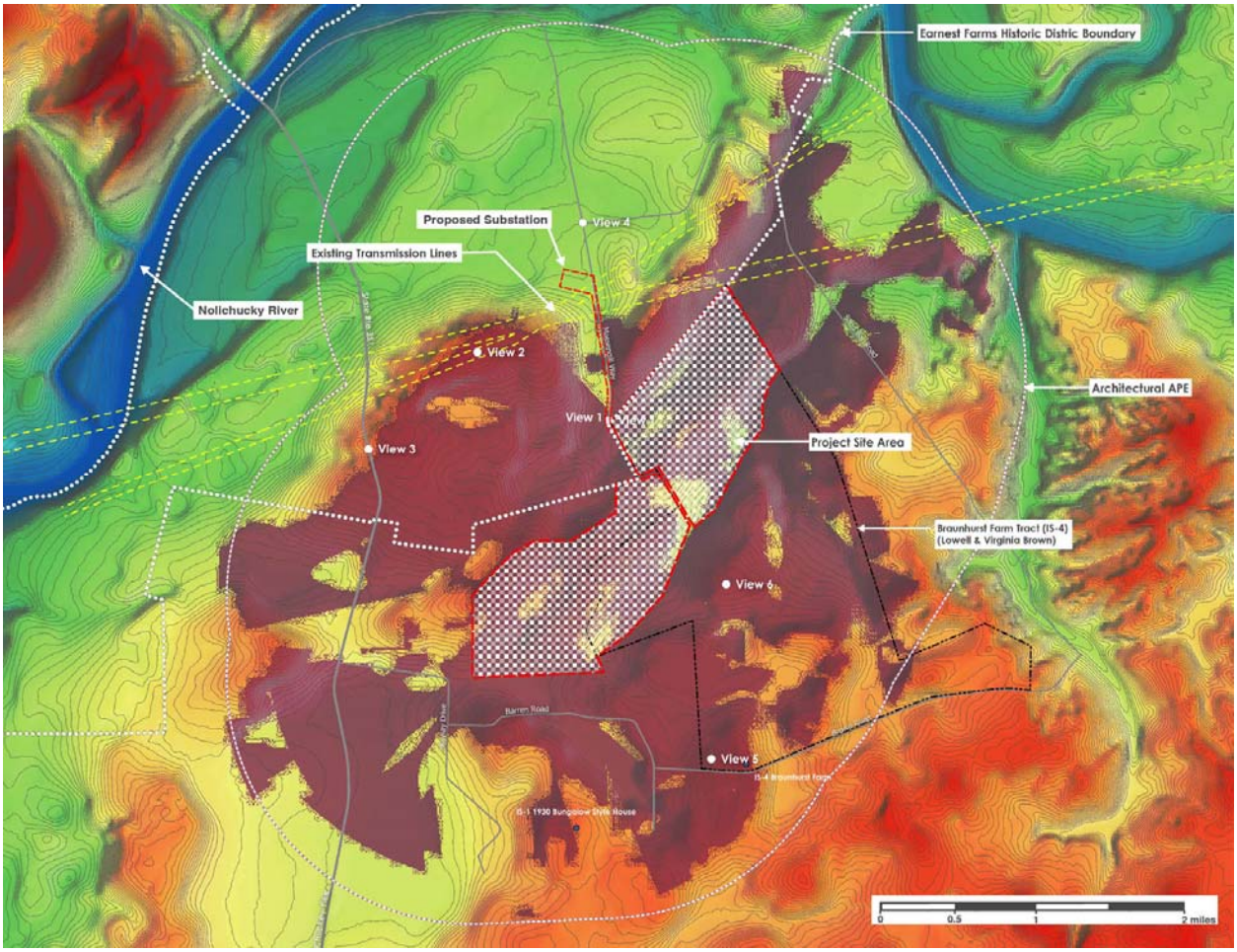

Figure 7. Viewshed of the Brown Swiss solar facilities. The solar facilities would be visible from the areas shaded dark brick-red. The other shading indicates elevation, with the lowest elevations along the Nolichucky River shown in blue and the highest elevations shown in dark red.

The area between the solar farm sites and the Nolichucky River to the north and west was listed on the National Register of Historic Places as the Earnest Farm Historic District in 2000. The proposed transmission interconnection facilities are located within the historic district. The Braunhurst Farm, which includes the northern solar farm site, was recently determined to be eligible for listing on the NRHP. The historic district listing and eligibility determination were based, in part, on the relatively intact scenic integrity of the area. These historic properties are described in more detail in Section 3.10.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project related impacts would occur. The landscape in the project area would remain relatively unchanged until the landowners change the current agricultural use of the area.

3.1.2.2 Alternative B – Proposed Action Alternative

As described above, much of the proposed solar facilities site is visible from nearby public roads and residences. From most of these locations, the site appears in the foreground (less than 0.5 mile) or middleground (0.5–4 miles) distances. The closest viewing points, at distances of about 100 yards, are from a few residences along Barren Road and the northeast corner of the Hensley Airpark community. The construction of the facilities would change the appearance of the site by the presence of heavy equipment, removal of vegetation, grading, installation of the security fencing, PV racking systems, PV panels, electrical connections, and converters and transformers, as well as the substation and electrical interconnection.

Once construction is completed, the landscape would be changed from rolling farmland with traditional farm crops to a more industrial appearance with multiple parallel rows of glass-faced panels on metal racks. Visibility of the solar facilities from the north would be restricted due to the ridgeline running southwest-northeast parallel to the northern site boundary. The proposed substation would, however, be visible from the north. Intervening high ground and woodlots would also restrict visibility of the solar facilities from portions of Sandbar Road and Brown Road east and south of the site.

The solar arrays would have a minimum setback of about 200 feet from residential properties south and west of the southern solar site. In order to reduce the visual impacts of the proposed facilities, Birdseye proposes to construct a visual buffer around the facilities as shown in Figure 3. The visual buffer would be located a short distance outside the perimeter fence at least 50 feet from adjacent residential properties and consist of native deciduous and coniferous trees and shrubs. The visual buffer at the proposed substation would be enhanced by constructing a raised earthen berm on which the trees would be planted.

Figures 8–13 show the current appearance of the project area from six viewpoints (mapped in Figure 7) and its simulated appearance after the facilities have been constructed and the trees planted in the visual buffers have grown to heights of about 23 feet (Figure 8), 30 feet (Figure 11), and 40 feet (Figure 13). The visual buffers would shield the PV arrays from many viewpoints at lower elevations or close to the site boundaries. Due to the presence of the PV arrays on rolling ridges within the site boundaries, the PV arrays would not be fully shielded by the visual buffers when viewed from several locations (e.g., Figures 8, 12, 13). The visual buffers would, however, serve to soften the appearance of the arrays on the far side of the buffers, reducing their visual impacts.

Figure 8. Current (top) and simulated (bottom) views of the proposed solar facilities at View 1, looking south from the south end of Massengill Way at the northwest corner of the north solar farm.

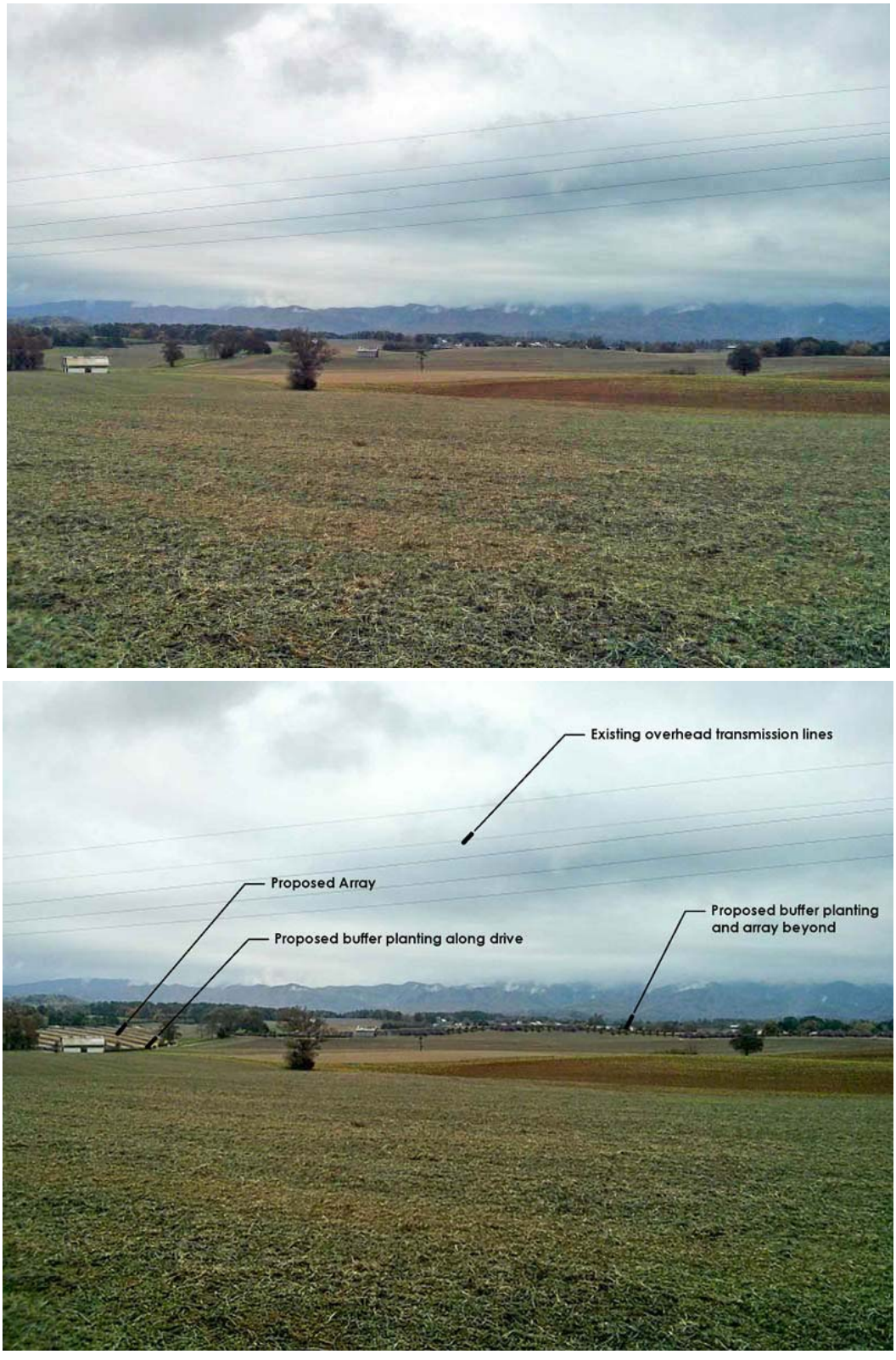

Figure 9. Current (top) and simulated (bottom) views of the proposed solar facilities at View 2, looking south from a high point in the field under the TVA transmission line between Massengill Way and Chuckey Pike.

Figure 10. Current (top) and simulated (bottom) views of the proposed solar facilities at View 3, looking southeast from Chuckey Pike at a point about 0.6 miles north of the intersection of Chuckey Pike and Ebenezer Road.

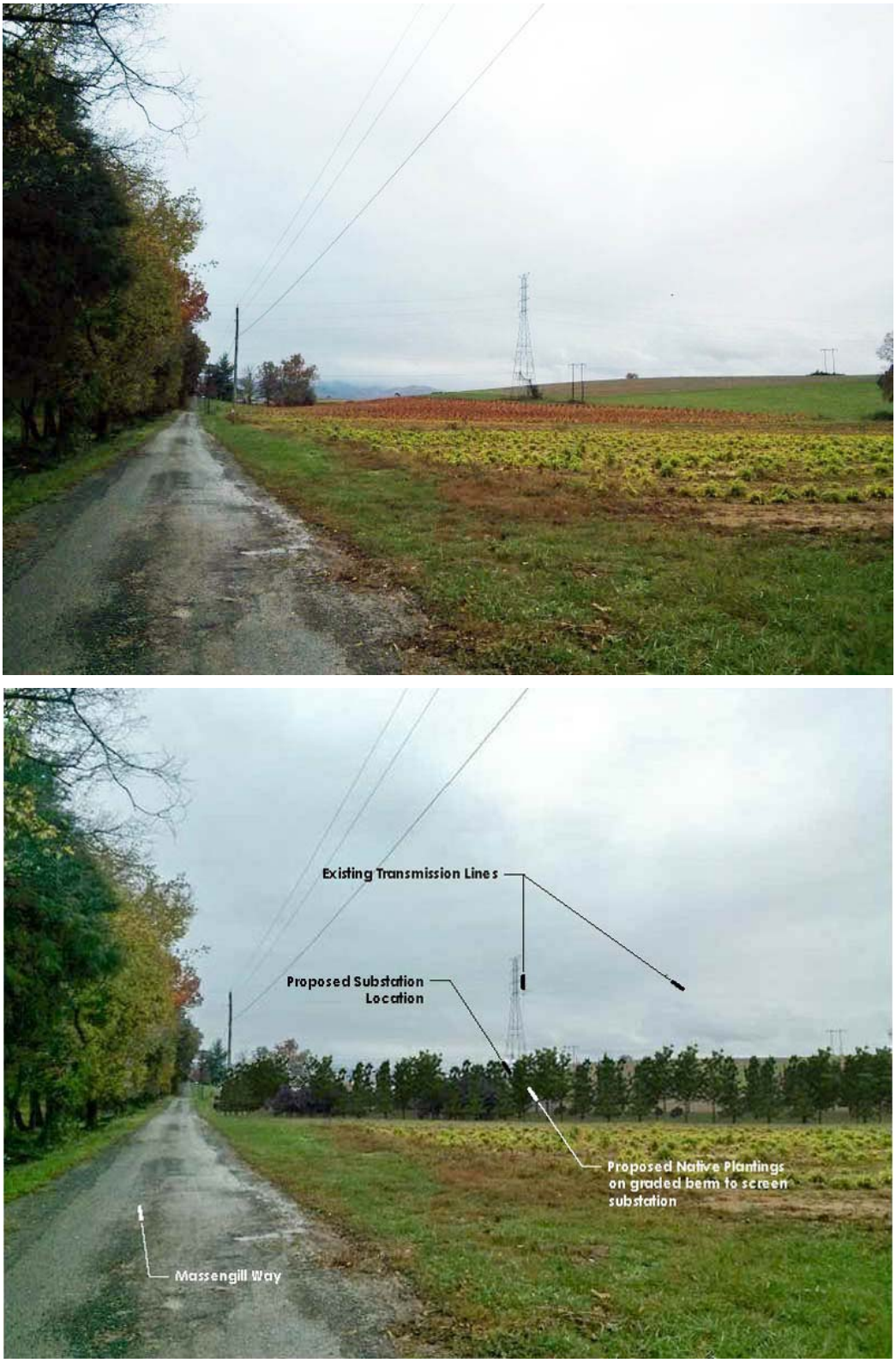

Figure 11. Current (top) and simulated (bottom) views of the proposed substation at View 4, looking south from the junction of Massengill Way and Sandbar Road.

Figure 12. Current (top) and simulated (bottom) views of the proposed solar facilities at View 5, looking north from Reece Road between its intersections with Barren and Brown Roads.

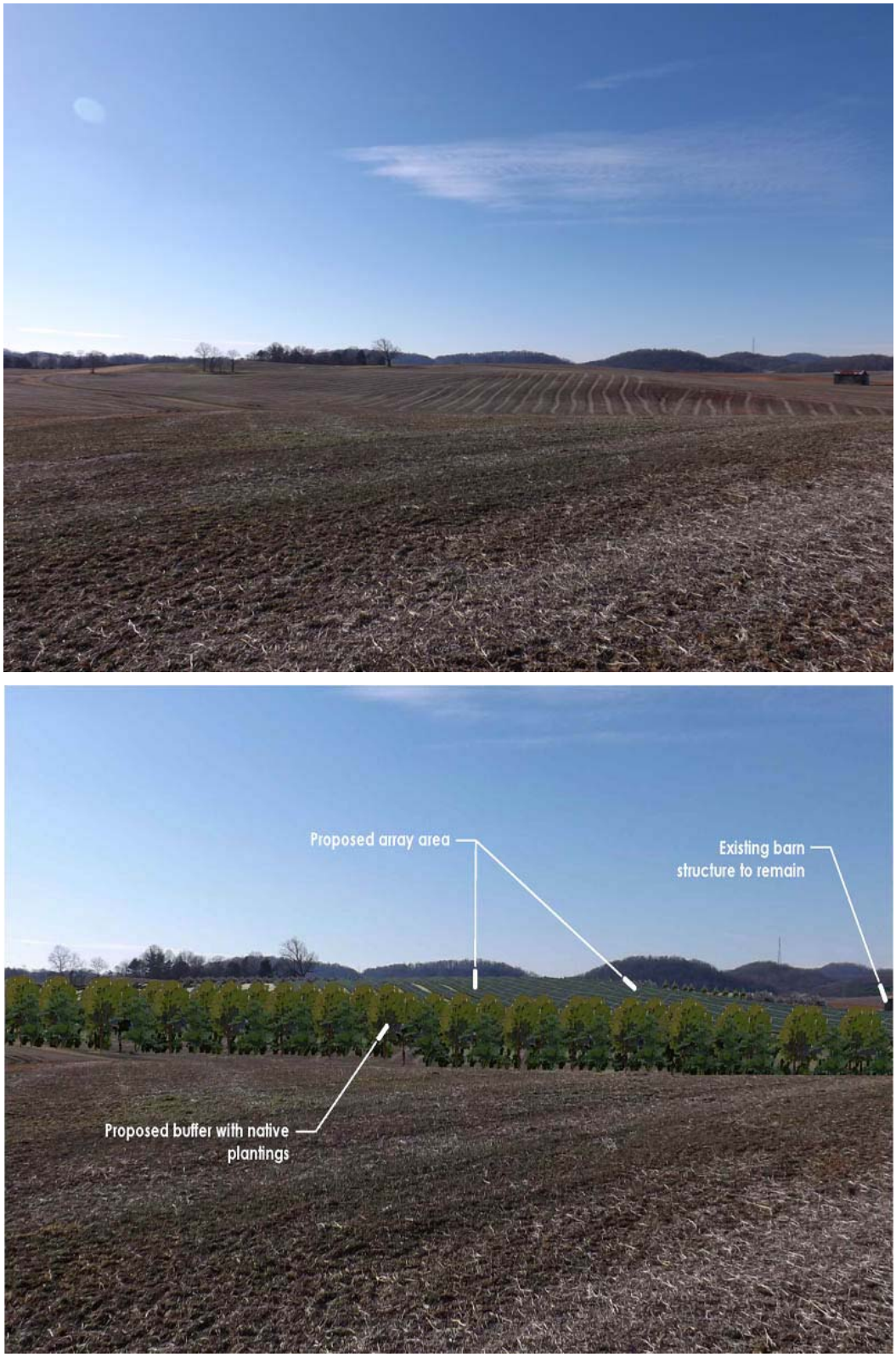

Figure 13. Current (top) and simulated (bottom) views of the proposed solar facilities at View 6, looking northwest from a high point in the field between the solar facilities and Brown Road.

Due to their glass surfaces, solar panels may create some glint or glare from the reflection of sunlight. To increase solar energy production, PV panels are designed with the goal of light absorption rather than reflectance, and the typical reflectance is less than a dark body of water such as a lake or pond. The amount of reflectance varies greatly and is influenced by several factors including time of day, atmospheric conditions, season, and an observer's viewpoint. While glint and glare can increase the visibility of PV panels, their overall effect is unlikely to greatly increase the visual impacts of the solar facilities. Given that much of the solar facilities would be screened from off-site viewing points by existing terrain features and the proposed vegetative screening, and that visible portions of the solar facilities would primarily be at background distances, overall visual impacts would be insignificant and no cumulative visual impacts are anticipated.

3.2 Land Use

3.2.1 Affected Environment

The project area is farmland, and portions of it have been farmed since the late 18th century. The current zoning on the project site is A-1, General Agriculture. This zoning is intended to provide space for agriculture and agriculturally oriented uses and structures, while allowing compatible residential and small-business development (Greene County Planning Commission 2011).

The overall study area consists of approximately 126 acres of open farm field including a 0.5 acre farm pond. Local farming on and surrounding the subject site is largely row crops including corn, tobacco, soybeans and sorghum. The adjacent landscape includes other similar farms, residential airpark community, and a dairy farm immediately to the north of the site.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project related impacts would occur. Current land uses in the project area would remain unchanged until the landowners decide to develop their property in a different manner.

3.2.2.2 Alternative B – Proposed Action Alternative

The construction and operation of the proposed solar facilities would change the land use of the solar facilities site from agricultural to light industrial. The medium to long term use of the land as solar facilities would not permanently restrict the land from future use for agricultural production, and the solar facilities would be dismantled and the site restored once the proposed PPA, and any potential subsequent new or extended PPA, expire. Surrounding land uses would not change as a result of this project.

The zoning within Greene County of this area is: *A-1* (General Agriculture). In March 2015, the Greene County Planning Commission approved the proposed zoning site plan for the proposed solar farm. In July 2015, the Greene County Planning Commission revised the A-1 zoning designation by adding requirements for solar farms. These requirements include security fencing, a buffer zone maintained as green and with a minimum width of 50 feet maintained outside the security fence, setback of at least 300 feet from any existing residences, completion of glare studies, and maintenance of pre-development surface water drainage patterns. The Birdseye solar facilities would comply with these requirements. Impacts to land use would be localized and insignificant and the presence of the solar facilities would have no effect on the use of nearby lands.

3.3 Geology, Soils, and Prime Farmland

3.3.1 Affected Environment

The subject site is located within the Valley and Ridge Physiographic Province (Miller 1974). This province is characterized by parallel ridges and valleys oriented from northeast to southwest. It is underlain by dolomite, limestone, and shale. Many of the valley areas, including in the project area, are karst. Karst is a landscape feature formed by dissolution of soluble rocks such as limestone, dolomite, and gypsum – which are present in some areas of Tennessee. Sinkholes and caves are sometimes formed in Karst topography and typically because of underground rivers and other drainage features. No observed evidence of sinkholes or other features typically associated with Karst topography were found on the site.

Elevations in the project area range from 1,393 feet to 1,488 feet above mean sea level with topography sloping to the northeast. The site contains rolling hills with moderately gentle draws where water collects and drains to the north and east.

The soils in this province are the residual product of in-place chemical weathering of rock presently underlying the site and/or historic depositional events. In general, shallow unconfined groundwater movement within the overlying soils is controlled largely by topographic gradients. However, as the ground water percolates downward, it becomes controlled by the subsurface geologic conditions. Surface waters primarily recharge shallow aquifers by infiltration along higher elevations. Once in the shallow aquifer, the groundwater typically discharges into streams or other surface water bodies at lower elevations.

Table 2 lists the soil types on the site of the proposed solar facilities. Soils on the 1.5-acre substation site are Holston loam, 2–5 percent slopes, and classified as prime farmland. An ASTM standard E1527-13 Phase I Environmental Site Assessment (ESA) was performed on the site on June 17, 2015 (ECS Project Number 45-1144 revised report dated July 24, 2015). The Phase I ESA did not identify potential contamination sources of soil and/or recognized environmental conditions in connection with the project areas or on the study area.

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). Approximately 67 percent (84 acres) of the 124-acre project area is classified as prime farmland and all of the project area is classified as farmland that is unique or of other state and local importance (see farmland rating maps in the appendices). Approximately 206,307 acres of Greene County are classified as farmable land, 52 percent of the county. Of this approximately 78,647 acres or 20 percent are considered a prime farmland.

Table 2. Soil types located on the solar facilities site.

Symbol	Soil Type and Phase	Percent of Site	Prime Farmland
Do	Dewey silty clay loam, 15–25% slopes, eroded	5.3	No
Dsh	Dunmore silty clay loam, eroded rolling phase	5.5	No
Ec	Emory silt loam, 0–4% slopes rarely flooded	11.1	Yes
Lc	Lindside silt loam	2.0	Yes
Hm	Holston loam, 2–5% slopes	16.2	Yes
Nd	Nolichucky cobbly fine sandy loam, eroded hilly phase	2.0	No
Nk	Nolichucky loam, eroded rolling phase	6.8	Yes
Oa	Ooltewah silt loam (lindside)	6.3	Yes
Tg	Tyler silt loam	15.5	Yes
Wd	Waynesboro loam, eroded rolling phase	28.1	No
We	Waynesboro loam, undulating phase	2.6	No

Source: NRCS (2013).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project related impacts would occur. The landscape in the project area would remain relatively unchanged until the landowners change the current use of the area.

3.3.2.2 Alternative B – Proposed Action Alternative

Under the Proposed Action Alternative, no impacts to geology and minor direct impacts to soil resources would result from the construction and operation of the solar facilities and electrical connection. Tall vegetation would be removed, the site would be mowed, and up to about 115 acres would be lightly graded. These actions would result in localized increases in erosion and sedimentation.

The solar arrays would be supported by steel piles which would either be driven or screwed into the ground to a depth of 6 to 10 feet. The disturbance to soils would include the driving of equipment and trucks, tractors and other vehicles on the site to facilitate movement of materials onto and around the site. The installation of posts and racking systems for the solar array, installation of fencing, and construction of the 1.5-acre substation would involve digging holes with augers, drills or other similar methods to achieve proper depth. In those locations, the spoil profile would be disturbed. This would affect a small percentage of the overall 124-acre site. The PV panels would be connected with underground wiring placed in trenches about three feet deep.

Additional minor excavations would be required for installing the medium voltage transformers associated with each solar farm array. Tower pads would be required to connect the arrays to the TVA transmission system. The towers would require some foundation work below the ground surface. As no significant or widespread excavation would be required, only minor direct impacts to geological and paleontological resources

would be anticipated. Significant increases in the runoff of soils or sediment is not expected due to the limited nature of the impervious surfaces created by this project.

Best Management Practices (BMPs) including silt fences, the use of stormwater and erosion control devices, covering stock piled soils, use of mulch, re- vegetation of exposed soils and avoiding earth moving activities during periods of high winds/precipitation will be required as conditions of construction and stormwater permits. Direct impacts to soils would be insignificant and no indirect or cumulative impacts are anticipated.

The Farmland Protection Policy Act (7 United States Code [U.S.C.] 4201 *et seq.*) requires Federal agencies to take into account the adverse effects of their actions on prime or unique farmlands. The purpose of the Act is "to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses." A Farmland Conversion Impact Rating (Form AD-1006) was completed by TVA and the National Resource Conservation Service (NRCS) to quantify the potential impacts to prime farmland. The impact rating considers the acreage of prime farmland to be converted, the relative abundance of prime farmland in the surrounding county, and other criteria such as distance from urban support services and built-up areas, potential effects of conversion on the local agricultural economy, and compatibility with existing agricultural use. Sites with a total score of at least 160 have the potential to adversely affect prime farmland. The impact rating score for the Brown Swiss project area was 193 points, well above the threshold score of 160 that indicates the potential to adversely affect prime farmland.

Under the Proposed Action construction and operation of the proposed solar facilities would convert all of the 124-acre project area, including 84 acres of prime farmland, to nonagricultural use, precluding farming for the duration of site operations. The grading primarily would be to smooth the soil surface to facilitate the installation of the racking systems and disturbed topsoil would be redistributed over the graded area. This would result in little degradation of soil function or quality on the majority of the project area.

Under regulations implementing the FPPA, when making decisions on proposed actions for sites with a score greater than 160, federal agencies must give consideration to the use of alternative sites that serve the purpose but convert fewer acres of farmland. Prior to selecting the current site for the solar facilities, Birdseye Renewable Energy considered an alternative site located a short distance to the north. Siting the facilities on the alternative site would have likely resulted in greater impacts to historic properties (see Section 3.11) and affected a similar or larger area of prime farmland. Two other sites were considered in adjacent Hawkins County, but found to be unsuitable due to transmission system constraints.

The proposed project area represents about 0.1 percent of the prime farmland in the county. The presence of the solar facilities would remove the project area from agricultural production while these facilities are in operation. However, at the end of the 20-year PPA and any subsequent extensions or new PPAs, the solar facilities would be removed and most of the site could be returned to cropland with little long-term loss of agricultural productivity. Consequently, long-term impacts to prime farmland would be insignificant.

3.4 Hydrology and Water Quality

3.4.1 Affected Environment

The project area drains to the Nolichucky River northeast of the solar facilities site. The USGS topographic map and the NRCS soil maps show two unnamed streams in the project area. One of these runs southwest-northeast across the northern solar farm site; this stream was not observed during a recent site survey. The second stream runs to the northeast along the southern borders of the two solar farm sites. Both mapped stream areas were evaluated by TDEC and the U.S. Army Corps of Engineers (USACE) during separate field visits. Both agencies independently found that the stream areas were not subject to Clean Water Act jurisdictional requirements, and the areas did not contain any characteristics of streams. No other streams or wet weather conveyances were observed on the solar facility or substation sites. One pond with a surveyed size of 0.549 acres occurs on the southern solar farm site. This pond is bordered by a riparian woodland.

Water quality information for the short, unnamed streams that receive drainage from the project area and empty into the Nolichucky River is not available. Portions of the Nolichucky River downstream of the project are listed on the Tennessee Clean Water Act Section 303(d) list of impaired waters as not meeting their designated uses due to the loss of biological integrity due to siltation (TDEC 2014). The causes of the siltation are listed as pasture grazing, a source in another state, and irrigated crop production. TDEC has developed and the U.S. Environmental Protection Agency has developed a Total Maximum Daily Load study to address the siltation.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related impacts to hydrology and water quality would occur.

3.4.2.2 Alternative B – Proposed Action Alternative

Before initiating site grading or other earth-moving construction activities, Birdseye would install stormwater erosion and sediment control devices and silt fencing in accordance with the stormwater pollution prevention plan required by the TDEC-issued construction stormwater permit. These measures and other BMPs would minimize the runoff of sediment from the solar facilities site. The construction of the substation and installation of the inverters and transformers would result in a small increase in impervious surfaces to about 1.5 percent of the project area. While the PV panels would intercept rainfall, the water would run off the lower edges of the panels onto permanently vegetated areas with little to no effects on site runoff patterns.

Throughout the construction and operation of the proposed facilities, an undisturbed buffer would be maintained around the pond on the southern solar farm site, and no streams or wet weather conveyances would be directly affected by construction activities. The conversion of the most of the site from row crop agriculture to permanent grasslands would likely improve water quality in the streams draining the site due to the reduction in fertilizer, pesticide, and silt runoff. Overall direct, indirect, and cumulative impacts to hydrology and water quality from the construction and operation of the proposed facilities would be insignificant.

3.5 Floodplains and Wetlands

3.5.1 Affected Environment

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the project area, the entire project area is located outside the 100- and-500-year floodplains. The nearest floodplains are adjacent to the Nolichucky River.

According to the National Wetland Inventory Map available from the U.S. Fish and Wildlife Service, there are no wetlands identified in the project area. The wetland survey conducted on June 16, 2015 identified one pond/lacustrine wetland with an area of 0.549 acres on the southern solar farm site. The TDEC and USACE confirmed through on-site visits in August and September, 2015, respectively that this pond is not regulated by the Clean Water Act.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project related impacts to floodplains or wetlands would occur.

3.5.2.2 Alternative B – Proposed Action Alternative

Under the Proposed Action, none of the components of the proposed Brown Swiss solar facilities would be constructed in floodplains and the proposed action would have no effects on floodplains. The action is consistent with the requirements of EO 11988, Floodplain Management.

No construction would occur in the 0.549-acre wetland/pond and a buffer area would be maintained around it and the adjacent riparian woodland (see Figure 3) during the construction and operation of the solar facilities. Silt fencing and/or other erosion controls installed in compliance with the construction stormwater permit would minimize runoff of sediment into this wetland area. Consequently, no adverse effects to the wetland are anticipated and the proposed action is consistent with the requirements of EO 11990, Protection of Wetlands.

3.6 Biological Resources

3.6.1 Affected Environment

The project area is located in the Valley and Ridge physiographic province and characterized by parallel valleys mostly cleared for agriculture and forested ridges. Almost all of the project site is farmed and the major crops are corn, sorghum, tobacco and soybeans. A few large scattered oak and hickory trees occur along the field borders. A forested area occurs just north of the northern solar facilities site and adjacent to the proposed power line connecting the solar facilities to the project substation. Common hardwood canopy species in the adjacent forested areas consist of oaks, hickories, and red maple. The most common conifers include short-leaf pine and eastern red cedar. Understory shrubs and vines include mountain laurel, saplings of the canopy trees, greenbriar, and grapes. Grasses and mixed herbaceous species are found on a sparse to moderately dense duff layer.

Mammals in the project area include those typical of rural forested and open country such as grey squirrels, cottontail rabbits, white-tailed deer, and raccoons. Bird species observed include perching birds including sparrows and warblers, raptors such including red-tailed hawks, and other including woodpeckers and scavengers such as the turkey vulture.

Several species listed as endangered or threatened under the Endangered Species Act (ESA) are known to occur in Greene County Tennessee (Table 3). The species are predominantly mussels and fish. No aquatic sites other than an isolated pond occur on the site, and suitable habitat for the listed mussels does not occur on the site or in the small streams receiving drainage from the site. Several state-listed species also occur in Greene County; other than the bats which are also federally listed, suitable habitat for state-listed species does not occur on the site. No designated critical habitat for species listed under the ESA occurs in the project area.

Table 3. Federally listed endangered and threatened species known to occur in Greene County, Tennessee.

Common Name	Scientific Name	Status
Mussels		
Cumberland bean	*Villosa trabalis*	Endangered
Purple bean	*Villosa perpurpurea*	Endangered
Green blossom	*Epioblasma torulsa*	Endangered
Turgid blossom	*Epioblasma turgidula*	Endangered
Cumberland monkeyface	*Quadrula intermedia*	Endangered
Pink mucket (pearlymussel)	*Lampsilis abrupta*	Endangered
Dromedary pearlymussel	*Dromus dromas*	Endangered
Littlewing pearlymussel	*Pegias fabula*	Endangered
Fineraved pigtoe (	*Fusconaia cuneolus*	Endangered
Rough rabbitsfoot (	*Quadrula cylindrical*	Endangered
Spectaclecase (mussel)	*Cumberlandia monodonta*	Endangered
Appalachian elktoe	*Alasmidonta raveneliana*	Endangered
Oyster mussel	*Epioblasma capsaeformis*	Endangered
Slabside pearlymussel	*Pleuronaia dolabelloides*	Endangered
Snuffbox mussel	*Epioblasma triquetra*	Endangered
Fluted kidneyshell	*Ptychobranchus subtentum*	Endangered
Fish		
Snail darter	*Percina tanasi*	Threatened
Chucky madtom	*Noturus crypticus*	Endangered
Mammals		
Gray bat	*Myotis grisescens*	Endangered
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened

The gray bat occupies caves throughout the year and forages primarily over bodies of water. No caves occur on or in the immediate vicinity of the project area. The pond on the southern solar farm site provides potential foraging habitat for the gray bat, as does the nearby Nolichucky River.

During winter, Indiana bats hibernate in caves and mines located in karst areas of the United States. In summer, it uses a variety of forest habitats for roosting, foraging, and raising young (USFWS 2014). Potential roost sites are located under the exfoliating bark, cracks, crevices, and/or hollow live trees or snags larger than 5 inches in diameter at breast height (dbh). Roost trees are typically within canopy gaps in a forest, in a fenceline, or

along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas. Potential foraging habitat occurs at the pond on the southern solar farm site and in the woodlands north of the northern solar farm site and east of the proposed transmission interconnection.

Similar to the Indiana bat, the northern long-eared bat hibernates in caves and mines in the winter. During summer, the northern long-eared bat roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees and/or snags typically 3 inches dbh or larger (USFWS 2014). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat selects roost trees based on their ability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. These bats emerge at dusk to forage in upland and lowland woodlots and tree-lined corridors, feeding on insects (USFWS 2014). Potential foraging habitat occurs at the pond on the southern solar farm site and in the woodlands north of the northern solar farm site and east of the proposed transmission interconnection. Suitable summer habitat consists of a wide variety of forested/wooded habitats and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Typical summer habitat is occupied from mid-May through mid-August each year (USFWS 2014).

A survey of potential summer roost trees for the Indiana and northern long-eared bats was conducted in November 2015. The survey included trees on the northern and southern solar farm sites and trees potentially affected by the construction of the transmission interconnection. The trees surrounding the pond on the southern solar farm site within the proposed buffer area were not surveyed. The survey identified 22 potentially affected trees, several of which were determined, based on their species, size, and/or condition, to provide suitable summer roosting habitat.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related impacts to biological resources, including endangered and threatened species, would occur.

3.6.2.2 Alternative B – Proposed Action Alternative

The construction and operation of the proposed solar facilities would have minor effects on vegetation and wildlife. Most of the project area is cropland and the species diversity of plants and animals is low. The removal of the few trees on the project area would affect a few wildlife species which are common in the surrounding area. The revegetation of the solar farm sites and their maintenance as permanent grasslands would likely result in a small increase in plant and animal diversity, although the numbers of some wildlife species using grassland habitat would be limited due to the presence of the PV arrays. Overall impacts on vegetation and wildlife would be insignificant.

The project area does not provide suitable habitat for endangered or threatened species except for the gray, Indiana, and northern-long eared bats, which are the only listed species that could be affected. The potential foraging habitat for the gray bat at the pond on the southern solar site would not be disturbed during facility construction or operation and therefore the gray bat would not be affected.

The proposed removal of trees determined to provide suitable summer roost habitat for the Indiana and northern long-eared bats could affect these species. As required by Section 7 of the ESA, TVA is consulting with the U.S. Fish and Wildlife Service on the potential effects of the proposed action on federally listed species. In order to reduce the potential effects on the Indiana and northern long-eared bats, TVA would require that Birdseye limit the clearing of trees suitable as summer roost habitat to between October 15 and March 31. TVA would also require Birdseye to implement any other mitigation measures identified during the consultation. With these limitations, the Indiana bat and the Northern long-eared bat are not likely to be adversely affected.

3.7 Air Quality and Greenhouse Gas Emissions

3.7.1 Affected Environment

Air quality is a valuable environmental resource. Through its passage of the Clean Air Act, Congress mandated the protection and enhancement of our nation's air quality resources. National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants have been set to protect the public health and welfare:

- Sulfur dioxide
- Ozone
- Nitrogen dioxide
- Particulate matter whose particles are less than or equal to 10 micrometers (PM_{10})
- Particulate matter whose particles are less than or equal to 2.5 micrometers ($PM_{2.5}$)
- Carbon monoxide
- Lead.

The primary NAAQS were promulgated to protect the public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas in violation of the NAAQS are designated as nonattainment areas. New sources to be located in or near these areas may be subject to more stringent air permitting requirements. Based on available ambient air quality data, Greene County is currently in attainment for all criteria pollutants (USEPA 2015a).

GHGs are chemical compounds in the Earth's atmosphere that trap and convert sunlight into infrared heat. Gases exhibiting greenhouse properties come from both natural and man-made sources. The most common GHGs emitted from natural processes and human activities include carbon dioxide, methane, and nitrous oxide. The primary GHG emitted by human activities in the U.S. is carbon dioxide, representing more than 80 percent of total GHG emissions, which comes mostly from energy use (USEPA 2015b). Agricultural activities also contribute to GHG emissions. Various management practices (e.g., irrigation, tillage, fertilizer application) for agricultural soils can lead to production and emissions of nitrous oxide. Management of agricultural soils accounts for more than half of the agriculture sector emissions, which was 9 percent of the total U.S. GHG emissions in 2013 (USEPA 2015c).

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related changes in air quality or greenhouse gas emissions would occur. The landscape in the project area would remain relatively unchanged until the landowners change the current agricultural use of the area.

3.7.2.2 Alternative B – Proposed Action Alternative

Minor impacts to air quality associated with the Proposed Action Alternative would occur during the 4–6 month construction period. Construction activities would result in emissions from construction equipment and vehicles, employee vehicles, and fugitive dust mobilization resulting from grading and vegetation clearing activities and on-site vehicle movement. Vehicles would emit particulate matter, nitrogen oxides, carbon monoxide, volatile organic compounds, and sulfur dioxide from the combustion of gasoline and diesel fuel. The impacts of these emissions would be negligible and would not adversely affect area air quality. Fugitive dust emissions would be primarily deposited at or in close proximity to the location of project activities and mostly within the project site. BMPs to reduce fugitive dust using water from nearby non-potable sources, limiting exposed soil piles, covering stockpiled materials, and limiting earth moving during high winds would be employed as necessary. Construction equipment would be equipped with required emissions control systems and maintained in good condition. Therefore, it is anticipated that air quality impacts associated with construction of the solar energy system would be negligible and limited in duration.

Minor increases in GHG emissions would result from construction activities. The impacts of these GHG emissions would be negligible in comparison to other regional sources of GHG emissions.

The operation of the solar energy system would result in a small increase in the capacity of non-emitting generating sources in TVA's energy resource portfolio and would generate power that otherwise would have been largely generated by the combustion of fossil fuels. Therefore, operation of the proposed solar energy system could result in a minor beneficial cumulative impact to air quality and reduced GHG emissions.

3.8 Noise

3.8.1 Affected Environment

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB. Noise levels of common activities include about 50 dBA for a normal conversation, 88 dBA for a large truck at 50 feet, and 140 dBA for a jet engine at takeoff at 75 feet. Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA and has been adopted by most Federal agencies (USEPA 1974). A DNL of 65 A-weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. The A-weighted sound level, used extensively in this country for the measurement of community and transportation noise, represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable

for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974).

The project area is located in a rural area of Greene County on the south side of the community of Chuckey. The project site is currently farmed and the major sources of noise are the operation of farm equipment, vehicle traffic on nearby roads, and natural sounds such as wind and wildlife. While no formal noise study was conducted as a part of this environmental review, ambient noise levels in rural settings such as the project area typically range from 45 to 55 dBA. Few sensitive noise receptors occur close to the project area. The nearest residences are along Barren Road and in the Hensley Airpark immediately southwest of the solar facilities and about 200–400 feet from the site boundary. The current Airpark residents are exposed to periodic noise levels of 100–110 dBA depending on their distance from the takeoff and landing of small private aircraft on the runway in Hensley Airpark.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related changes to the area noise environment would occur.

3.8.2.2 Alternative B – Proposed Action Alternative

Construction noise would cause temporary and short-term adverse impacts to the ambient sound environment around the project site. Homeowners adjacent to the property boundary would likely experience an increase in the daytime noise levels from the operation of construction equipment. The use of particular pieces of construction equipment would vary during the construction period, with most earthmoving equipment used early in the construction period and trenching and pile-driving equipment used later. Construction would normally occur during daylight hours Monday through Friday. Depending on the construction schedule and other factors, limited weekend and/or night-time construction could occur. Construction would take four to six months and employ up to 200 workers during peak construction.

The equipment most likely to make the most noise would be the pile-driving activities during the construction of the array and structure foundations. Standard construction pile drivers are estimated to produce between 95 and 100 dBA at a distance of 50 feet (USDOT 2015). The specialty pile drivers proposed to be used for solar panel installation produce less noise than those which are used for driving piles designed to support bridges or buildings, and the piles supporting solar panels would be driven into soil with as little drilling into rock as possible. Construction workers would wear appropriate hearing protection in accordance with Occupational Safety and Health Act (OSHA) regulations. The only sources of noise during the operation of the solar facilities would be from periodic maintenance activities, particularly mowing to control the height of vegetation.

Construction activities would increase noise on a localized level. However, these impacts to noise levels will be temporary and sporadic and would not significantly impact the overall long-term noise levels of the project site and surrounding areas.

3.9 Transportation

3.9.1 Affected Environment

The project area is located in a rural/residential area of Chuckey, Tennessee. The locally important roads for access to the project area are Chuckey Pike (State Route [SR] 351) to the west, Sandbar Road to the north and east, and Massengill Way, which branches off of Sandbar Road immediately north of the site and which dead ends on the site. Sandbar Road and Massengill Way are narrow, lightly traveled roads primarily used by local residents. Traffic count data is not available for any of these roads in the vicinity of the project area. The 2014 annual average daily traffic count on Chuckey Pike a short distance north of the Nolichucky River was 1,225 vehicles (TDOT 2015).

Two airstrips (Federal Aviation Administration [FAA] identifier 04TN), a 3,000-foot paved runway and an adjacent 1,600-foot grass runway, are located in the Hensley Airpark Aviation Community bordering the southwest corner of the proposed solar facilities (see Figure 3). The runways are for private, non-commercial use by the residents of the Airpark community. The airstrip is not regulated by the FAA nor is it covered under FAA guidelines. Aircraft types operated at this airport include 22 privately owned small, non-commercial, single-engine aircraft, according to AirNav.com.

Other neighboring properties include low density rural homes and farmland. No major industry, schools, churches, shopping centers or other highly trafficked properties are located adjacent to the site.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related impacts to transportation would occur.

3.9.2.2 Alternative B – Proposed Action Alternative

The construction of the proposed facilities would result in a temporary increase in traffic on area roads. During construction of the proposed solar facilities and substation, a maximum crew of about 200 workers would be present from approximately 7 am to 5 pm, four to seven days a week, for four to six months. A majority of these workers would likely come from the surrounding area; those from outside the surrounding area would likely stay in hotels in Greeneville. Workers would either drive their own vehicles or carpool to the project area and parking would be on-site. The roads most likely to experience increased traffic are Chuckey Pike, Sandbar Road, Massengill Way, and farther from the site, Andrew Johnson Highway (US Highway 321/11E). The primary construction and maintenance access would be from Massengill Way to permanent on-site access roads. These roads would be gated and closed to public access.

The work teams would be released during the lunch break and some would likely visit local restaurants and businesses at this time. Traffic flow around the work sites would, therefore, be heaviest at the beginning of the work day, at lunch, and at the end of the work day. Several residences located along these roadways could be affected by the construction traffic. Should traffic flow be a problem, Birdseye would consider staggered work shifts to space out the flow of traffic to and from the project site. Birdseye would also consider posting a flag person during the heavy commute periods to manage traffic flow and to prioritize access for local residents. Use of such mitigation measures would minimize potential adverse impacts to traffic and transportation to less than significant levels. Construction equipment and material delivery would require approximately three to five

semi-tractor trailer trucks visiting each site per day over the course of the construction activities. These vehicles can currently be accommodated by existing roadways; therefore, only minor impacts to transportation resources in the local area would be anticipated as a result of construction vehicle activity.

Given the proximity of the proposed solar facilities to the nearby Hensley Airpark runways, an analysis of the potential glare produced by the proposed solar arrays and perceived by pilots was conducted using the Solar Glare Hazard Analysis Tool (SGHAT; Ho and Sims 2013) for the Hensley Airpark (04TN) and for the Greeneville Municipal Airport (GCY) located approximately 8 miles west of the project area. The Hensley Airpark runways are oriented slightly east of due north-south. The Greeneville runway is oriented southwest-northeast. Glare is defined as obscuration of an object in a person's field of vision due to a bright light source located near the same line of sight. Afterimage, the temporary image that appears in a person's vision after prolonged exposure to the original image has ceased, has the potential to hamper a pilot's vision.

The results of the SGHAT analysis are summarized in Table 4 and show that the potential for glare perceived by pilots is restricted to the early morning. At Henley Airpark, it would affect pilots on a north-bound approach from March through September. At Greeneville, it would affect pilots approaching in both directions for short time periods during the spring and fall. In all cases, due to the restricted timeframes and low potential for afterimage, the glare that would be produced by the solar arrays is not expected to affect aircraft pilots, particularly during takeoff and landing.

Table 4. Results of SGHAT glare analysis for the Hensley Airpark and Greeneville Municipal Airport.

Airport and Approach Direction	Glare Findings*	Time of Day (24 Hour Clock)	Time of Year
Hensley from north	Low potential for temporary afterimage at distances < 1 mile	0600-0700	March-September
Hensley from south	No glare	N/A	N/A
Greeneville from southwest	Low potential for temporary afterimage at distances < 2 miles	0600-0700	March-April and August-September
Greeneville from northeast	Low potential for temporary afterimage at distances at distances < ¼ mile	0600-0700	September only

*Distances are from runway along approach path.

The FAA requires approval of solar arrays on airport properties in cases where the FAA has jurisdiction over the airport with respect to facilities and air traffic control. Many larger municipal and international airports have recently installed solar arrays on the airport site in order to balance energy costs and reduce greenhouse gas emissions. These airports include Charlotte-Douglas (CLT); Indianapolis (IND); Smyrna, Tennessee (MQY); Chattanooga (CHA); and Baltimore-Washington (BWI). To date, no adverse impacts,

accidents or incidents at these airports related to or attributed to solar panel installations and any resulting glare have been reported to or by the FAA. Any glare produced by the proposed solar facilities is not expected to adversely affect air traffic.

3.10 Cultural Resources

Cultural resources include, but are not limited to, prehistoric and historic archaeological sites, historic structures, and historic sites at which important events occurred. Cultural resources are finite, non-renewable, and often fragile. They are frequently threatened by industrial, commercial, and residential development, as well as construction of roads and other infrastructure. Under Section 106 of the National Historic Preservation Act of 1966 (NHPA), TVA is required to consider ways to avoid or minimize effects from TVA undertakings on significant cultural resources. The NHPA addresses the preservation of "historic properties," which are defined under the Act as any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP).

Two broad categories of cultural resources are archaeological resources and historic architecture. Some examples of archaeological resources are earthworks, weapons and projectiles, human remains, rock carvings, and remains of subsurface structures, such as domestic fire pits. Historic architecture consists of standing structures that are 50 years old or older. Consistent with Section 106 of the NHPA, such structures, as well as archaeological resources, must meet certain criteria to qualify for inclusion on the NRHP.

3.10.1 Affected Environment

The project study area is located in Chuckey, Tennessee. This area is best known as the birthplace of Davey Crockett, a nearly mythic figure who served in Congress and was a soldier and statesman from the nation's early days as a republic. Also, some of the region's oldest farms still intact currently exist or operate in the area. Among those near the project site include the Earnest Farms Historic District, which is listed in the National Register of Historic Places (NRHP) and the Braunhurst Farm,

Tennessee Valley Archaeological Research (TVAR) conducted a Phase I cultural resources survey of the area of potential effect (APE) of the proposed facilities (Dadiego et al. 2015). The APE for archaeological resources consisted of the 124-acre project site including the location of the solar arrays, the substation, and the connecting transmission line. The APE for historic architectural resources consisted of the area within a 0.5-mile radius surrounding the entire project site. Site file and literature searches indicated no previously recorded archaeological sites were located within the APE. The Phase I survey identified four archaeological sites and four isolated finds of archaeological material. None of the archaeological sites or isolated finds was recommended by TVAR to be eligible for inclusion in the NRHP.

Site file and literature searches identified one NRHP-listed historic architectural property, the Earnest Farm Historic District, within the architectural APE. This property was listed on the NRHP in 2000 under Criterion (a) of 36 CFR § 60.4 for its association with the early settlement patterns of East Tennessee and its agricultural significance as the oldest century farm in the state and under Criterion (c) for its architectural significance. The nomination includes 34 buildings, three sites, and six structures as well as the agricultural fields themselves.

Twelve previously unrecorded architectural resources were recorded within the APE. TVAR recommended two of these, IS-1, a ca. 1930 bungalow, and IS-4, Braunhurst Farm, eligible for inclusion in the NRHP. IS-1 was recommended as eligible under Criterion (c) for its local significance as a representative example of bungalow-influenced architecture. The Braunhurst Farm was recommended as eligible under Criterion (c) for its local significance as a representative example of a mid-twentieth century farmstead anchored by a two-story Folk Victorian style residence, and as a contributing resource to the Earnest Farms Historic District. The other ten architectural resources were determined ineligible due to their lack of architectural distinction and loss of integrity resulting from modern alterations and/or damage.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project related impacts to historic properties would occur. The landscape in the project area would remain relatively unchanged until the landowners change the current agricultural use of their lands.

3.10.2.2 Alternative B – Proposed Action Alternative

In July 2015, TVA consulted with the Tennessee State Historic Preservation Office (SHPO) on the effects of the proposed undertaking (i.e., the Proposed Action Alternative) on historic properties (see correspondence in Appendix A). Based on the recommendations by TVAR, TVA determined, in consultation with the SHPO, that the proposed undertaking would not affect archaeological sites included or eligible for inclusion in the NRHP. It was also determined that the IS-1 bungalow would not be affected due to the shielding effects of terrain and woodlands.

TVA and the SHPO agreed that the proposed undertaking would result in adverse effects to the NRHP-listed Earnest Farms Historic District resulting from the construction of the transmission line and substation within the district and the visual effects of the adjacent solar facilities. TVA and the SHPO also agreed that the proposed undertaking would result in adverse effects to the NRHP-eligible Braunhurst Farm. Birdseye and TVA explored measures to avoid these adverse effects. Due to the siting requirements of a 20-MW solar farm in east Tennessee, including direct access to the TVA transmission system, a minimum of about 125 contiguous cleared acres, favorable topography with southern facing slopes, and willing landowners, alternative sites were extremely limited. As described in Section 2.1.3, Birdseye considered three other sites and determined they were not feasible. One of these sites is a short distance north of the current site. This alternative site was eliminated because all of the facilities would have been within the Earnest Farms Historic District. While the current site avoids most of the impacts to the Historic District that would have resulted from the previously considered site, the Historic District would be adversely affected by the installation of the transmission line and substation and the visual intrusion of the solar panels. The Braunhurst Farm would also be adversely affected as about 49 acres of the proposed solar facilities would be within the ca. 226-acre historic property.

Figure 7 illustrates areas within the Earnest Farms and Braunhurst Farm properties where the solar facilities would be visible. These areas would be reduced, but not eliminated, by the proposed vegetative screening described in Section 2.2 and illustrated in Section 3.1. TVA therefore proposes additional measures to minimize and mitigate the adverse effects. These measures are described in detail in a Memorandum of Agreement (MOA) between TVA and the SHPO (Appendix A). These measures include the following:

- Updating the NRHP registration form for the Earnest Farms Historic District to include observations and data generated during the recent survey undertaken for the proposed solar facilities.
- Developing an educational driving tour pamphlet or brochure describing the Braunhurst Farm, Earnest Farms, and other historical sites in the area. The brochure would be made available to the public at appropriate area locations.

TVA has consulted on a government-to government basis with the Cherokee Nation, Eastern Band of Cherokee Indians, Kialegee Tribal Town, Muscogee (Creek) Nation, Thlopthlocco Tribal Town, and the United Keetoowah Band of Cherokee Indians in Oklahoma regarding the proposed action's potential to affect historic properties that are of religious and cultural significance to federally-recognized Indian tribes. None of the consulted tribes identified such properties or objected to the proposed action.

3.11 Socioeconomics and Environmental Justice

3.11.1 Affected Environment

The proposed solar facilities site is located in the unincorporated community of Chuckey in eastern Greene County. The site is about 9 miles east-northeast of Greeneville, the county seat, and about 1.5 miles west of the Greene-Washington County border. The site is currently farmed and provides seasonal employment for a small number of farm workers. The area surrounding the site is rural and primarily agricultural, with a few clustered residential areas. Table 5 lists census, demographic, and economic data for the project area, Greene County. and Tennessee.

Table 5. Census and demographic data for the project area, Greene County, and Tennessee.

Census Categories	Project Area	Greene County	Tennessee
Population, 2010	448	68,831	6,346,105
Population, 2014 estimate	--	68,335	6,549,352
Population, percent change, 2010–2014	--	-0.7%	3.2%
Total Employment, 2013	--	21,597	2,394,068
Unemployment Rate, October 2015	--	6.3	5.4
Minority population, 2014	3%[1]	4.3%	21.1%
Hispanic population, 2014	2%[1]	2.8%	5.0%
Median household annual income, 2010–2014	$33,163[2]	$35,860	$44,621
Per capita annual income, 2010–2014	$19,134[2]	$19,998	$24,811
Persons below poverty, percent, 2013	25.4%[2]	19.6%	18.3%

[1]2008-2012 Estimate from American Community Survey
[2]For Census Tract 910
Sources: Bureau of Labor Statistics (2015), U.S. Census Bureau (2015a, 2015b).

Executive Order (EO) 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations was issued in 1994 to focus federal attention on the environmental and human health effects of federal actions on minority and

low-income populations, with the goal of achieving environmental protection for all communities. The EO directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations to the greatest extent practicable and permitted by law. Although EO 12898 does not apply to TVA, TVA routinely considers environmental justice in its planning processes.

Relative to the state of Tennessee, Greene County has a slightly higher unemployment rate. The proportions of non-white minority and Hispanic individuals in the project area (i.e., within a 1-mile radius of the site) is somewhat lower than the county proportions, and both the project area and county proportions are much lower than the state proportions. Both median household and per capita incomes of residents within Census Tract 910, which contains the project site, are somewhat lower than for Greene County. The poverty rate for residents of Census Tract 910 is considerably higher than for Greene County.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related changes in area socioeconomic conditions or disproportionate adverse environmental or health impacts to low-income or minority populations would occur.

3.11.2.2 Alternative B – Proposed Action Alternative

The construction of the proposed solar facilities would take four to six months to complete. The number of construction workers would vary during the construction period and up to 200 workers would be employed during peak construction. Most of the workers would be come from the local/regional workforce and a small number of specialized workers would likely be brought in from outside the region. Short-term beneficial economic impacts would result from construction activities, including the purchase of some materials, equipment, and services locally, and a temporary increase in local employment and income. This increase would have positive impacts locally and regionally.

No permanent, on-site employees would be required to operate and maintain the solar facilities. The main, regularly occurring maintenance activity would be the mowing of the solar facility sites by local contractors.

The project site is currently taxed at a reduced Greenbelt rate designed to maintain applicable to agricultural, forest, and open space areas and reduce urbanization. Following the completion of the solar facilities, the site would no longer quality for the reduced rate and county property tax payments would increase between $25,000 and $35,000 per year. This would result in a small economic benefit for the area. Overall socioeconomic impacts would be beneficial but small in proportion to the area economy.

Few residences occur in the immediate vicinity of the facilities and the few off-site impacts resulting from the construction and operation of the facilities would be minor and mostly short-term. The local minority population is lower than county and state percentages. The poverty rate within the larger Census Tract containing the project site is higher than proportion of minority residents in the vicinity of the site is lower than county and state rates. The residents living closest to the project site, however, appear to have average to higher-than-average incomes. No disproportionate impacts to minority or low income populations are anticipated from the construction and operation of the proposed solar facilities.

3.12 Solid and Hazardous Waste

3.12.1 Affected Environment

The project area has been farmed for several decades. An ASTM standard E1527-13 Phase I Environmental Site Assessment (ESA) was performed on the site on June 17, 2015 (ECS Project Number 45-1144 revised report dated July 24, 2015). The Phase I ESA did not identify the presence, former use or spillage of hazardous substances or petroleum products or recognized environmental conditions.

Greene County and Greeneville jointly own a Class III/IV demolition landfill and waste transfer station at 1555 Old Stage Road, Greeneville, approximately eight road miles from the solar facilities site. This landfill accepts construction and demolition waste for disposal. Other waste is accepted by the transfer station and then hauled to a Waste Industries' landfill in Hamblen County, Tennessee. Both landfills have ample capacity for disposing of any waste generated by the construction and operation of the proposed solar facilities.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, no project-related impacts associated with solid and hazardous waste would occur.

3.12.2.2 Alternative B – Proposed Action Alternative

Minimal waste, consisting mainly of a few trees and other tall vegetation, would be generated during site preparation. The materials used for construction of the project would include PV panels, metal racking and mounting systems, electrical connectors, cable, wire and general building materials such as crushed stone, concrete and asphalt. These materials would be delivered to the site and utilized in the manner specified in project drawings. Packaging waste and other waste generated during construction would be collected and segregated by type in on-site receptacles prior to removal from the site. Wastes would be recycled to the extent feasible and remaining wastes would be trucked to the construction and demolition landfill and transfer station on Old Stage Road for disposal. The construction and demolition landfill, as well as the Hamblen County landfill receiving other wastes both have ample capacity for disposing of waste generated during construction of the solar facilities and transmission interconnection.

No hazardous waste would be generated during the construction and operation of the facilities. Birdseye Energy would implement procedures to minimize fuel spills during construction and operation of the facilities. Waste generated during operation would be minimal and would mainly result from replacement of equipment. Upon expiration of the 20-year PPA or an amended or alternative PPA for the sale of power after the 20-year period, Birdseye Energy would develop a decommissioning plan to document the recycling and/or disposal of solar facility components in accordance with applicable regulations. Impacts from the generation of solid and hazardous waste during the construction and operation of the proposed facilities would be insignificant.

3.13 Unavoidable Adverse Environmental Impacts

The Proposed Action could cause some unavoidable adverse environmental effects. Specifically, construction activities would increase noise and traffic as well as impact the aesthetics of the general area. The vegetative buffer to be installed around much of the solar facilities and the substation would help reduce visual impacts. Construction activities would be limited to daytime hours, which would help minimize noise impacts. The adverse

impacts to the Earnest Farms Historic District and the historic Braunhurst Farm would be mitigated according to the measures prescribed in the Programmatic Agreement developed with the Tennessee State Historic Preservation Office. With the application of appropriate best management practices, few other unavoidable adverse effects are expected.

3.14 Relationship of Short-Term Uses and Long-Term Productivity

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and uses of water resources. Long-term productivity is the capability of the land to provide resources, both market and non-market, for future generations.

In this context, long-term impacts to site productivity would be those that last beyond the life of the project. The Proposed Action would affect short-term uses of the project site by converting it from agricultural production to solar power generation. The effects on long-term productivity would be minimal as agricultural production could be readily restored on all but a very small portion of the solar facility site following the decommissioning and removal of the solar facilities.

3.15 Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources would occur when resources would be consumed, committed, or lost because of the project. The commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project and possibly beyond.

Construction and operation activities would result in an irretrievable and irreversible commitment of natural and physical resources. The implementation of the Proposed Action Alternative would involve irreversible commitment of fuel and resource labor required for the construction, maintenance, and operation of the solar energy system. It would also involve the commitment of prime farmland within the project area for the life of the solar energy system. Because removal of the solar arrays and associated on-site infrastructure could be accomplished rather easily, and the facility would not irreversibly alter the site, the project site could be returned to its original condition or used for other productive purposes once it is decommissioned. Most of the solar facility components could also be recycled after the facility is decommissioned.

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Appendix A – Correspondence

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

July 8, 2015

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), BROWN SWISS SOLAR PROJECT, CHUCKEY, GREENE COUNTY, TENNESSEE (36.195557° N, 82.671539° W)

TVA proposes to enter into a power purchase agreement (PPA) with a subsidiary of Birdseye Renewable Energy (Birdseye), through the Renewable Standard Offer (RSO) and Solar Solutions Initiative (SSI) programs for the construction, operation, and maintenance of a photovoltaic power project near Chuckey in Greene County, Tennessee. TVA's RSO program offers pre-set prices (the "standard offer") and terms and conditions for power generated by selected renewable energy technologies. TVA's SSI program provides incentive payments for mid-size solar projects in the RSO program that use local installers. TVA would enter into a PPA with Brown Swiss LLC, a subsidiary of Birdseye, for their ca. 20 megawatt (MW) solar array on two tracts located near Chuckey, totaling ca. 120 acres. TVA has determined that the proposed PPA constitutes an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties. In this letter, we are initiating consultation with your office regarding the proposed Brown Swiss Solar Farm project.

The photovoltaic power system would be constructed on two adjacent tracts, with areas of 74 and 48 acres. The photovoltaic array ("solar panels") would be installed on a ground-mounted racking system constructed of galvanized steel racks, supported by galvanized steel piles driven four to six feet into the ground. The solar panels would be arranged in parallel rows and would have a total height of approximately 8-9 feet. The DC electrical current from the solar panels would be converted to AC electrical energy by string inverters. The 22 inverters will feed the AC power through underground wiring to an electrical transformer. A 22.86-kV transmission line (TL) would feed the power to a substation, to be constructed on the west side of Massengil Way ca. 1500 feet north of the solar array adjacent to TVA's existing Tusculum-Washington College 69-kV TL. Birdseye proposes to build the 22.86-kV feeder line, along an existing local utility easement, that parallels Massengil Way.

Construction of the system and the substation would include vegetation clearing as necessary, installing the photovoltaic array, installing underground wiring in trenches, limited grading for unpaved access roads within the project site, and installing an electrical transmission line to connect the system's transformer to the new substation. Vegetation clearing would be limited to a small number of isolated trees. Vehicular access and electrical connections would be along a

single route connecting to Massengil Way. TVA has determined that the area of potential effects (APE) for archaeological resources consists of the total area to be leased by Birdseye, which is 124 acres and includes the ca. 120-acre project site, the ca. 1500 feet of 75-ft ROW in which the electrical connection would be installed, and the ca. 2-acre substation site. The APE for historic architectural resources consists of the area within a 0.5-mile radius surrounding the entire project site.

Birdseye contracted with Tennessee Valley Archaeological Research (TVAR) to perform a phase I cultural resources survey of the APE. Enclosed are two copies of the draft report titled *A Phase I Cultural Resources Survey of the Brown Swiss LLC Proposed Solar Farm in Chuckey, Greene County, Tennessee*, along with two CDs containing digital copies of the report.

TVAR's site file and literature search indicated that no previously recorded archaeological sites are located within the APE. The archaeological survey identified four archaeological sites (40GN333, 40GN334, 40GN335, and 40GN336) and four isolated finds of archeaological material. TVAR recommends that all four sites and isolated finds are ineligible for inclusion in the National Register of Historic Places (NRHP), and that no additional archaeological investigations are needed in association with the proposed undertaking.

TVAR's site file and literature search identified one NRHP-listed historic architectural property within the architectural APE: Earnest Farms Historic District. This property was listed on the NRHP in 2000 under criterion A for its association with the early settlement patterns of East Tennessee and its agricultural significance as the oldest century farm in the state. The district also was listed under criterion C for its architectural significance. The nomination includes 34 buildings, three sites, and six structures as well as the agricultural fields themselves. The proposed solar array would share a boundary with the Earnest Farms Historic District. TVAR recommends that the undertaking would result in an adverse visual effect on this resource.

Twelve previously unrecorded architectural resources (designated IS-1 through IS-12 by TVAR) were recorded within the APE during the architectural survey. TVAR recommends two of these, IS-1 (ca. 1930 bungalow) and IS-4 (Braunhurst Farm) eligible for inclusion in the NRHP. IS-1 is recommended eligible under criterion C for its local significance as a representative example of bungalow-influenced architecture. TVAR recommends that the undertaking would have no effects on IS-1 (ca. 1930 bungalow) due to the shielding effects of terrain and mature vegetation.

TVAR recommends IS-4 (Braunhurst Farm) eligible under criterion C for its local significance as a representative example of a mid-twentieth century farmstead anchored by a two-story Folk Victorian style residence, and as a contributing resource to the Earnest Farms Historic District. The northern project tract would be located within TVAR's recommended Braunhurst Farm NRHP boundary, and the southern project tract would share a boundary with the district (see "Viewshed Study" figure, below). TVAR recommends that the undertaking would result in an adverse effect on IS-2 (Braunhurst Farm) due to visual, atmospheric and audible elements that would diminish the property's integrity.

TVAR recommends that the remaining identified historic architectural properties (IS-2, IS-3, and IS-5 through IS-12) are ineligible for inclusion in the NRHP.

TVA has reviewed the enclosed report and agrees with TVAR's recommendations concerning the NRHP eligibility of the identified resources. Based on the cultural resources survey, and pending your concurrence, TVA finds that one NRHP-listed resource and two NRHP-eligible historic architectural properties are located within the APE. TVA finds further that the proposed undertaking would result in an adverse effect to two of these resources, NRHP-eligible Braunhurst Farm and NRHP-listed Earnest Farms Historic District.

TVA is seeking ways to avoid effects to Braunhurst Farm and Earnest Farms Historic District. However, due to the scale of the project and its location on one of the highest topographic locations in the APE, TVA has been unable to find any avoidance measures that would be technically feasible and economically prudent. Pending your concurrence with TVA's findings and determinations, and pursuant to 36 CFR § 800.6(a)(1) we plan to notify the Advisory Council on Historic Preservation of the adverse effect finding. We propose, further, to invite your office to enter into a Memorandum of Agreement (MOA) with TVA for the resolution of the adverse effects. The MOA will stipulate measures to reduce and mitigate the adverse project effects to Braunhurst Farm and Earnest Farms Historic District. Below, we briefly describe measures that we suggest be included in the MOA.

TVA proposes to commit, as a stipulation in the MOA, to reduce the visual effect through vegetative screening. Native plant species would be planted in multiple rows surrounding those portions of the project where such screening would be effective in reducing or minimizing the adverse effect. The "Conceptual Site Plan" figure, below, presents Birdseye's proposed vegetative screening plan. Following that figure, six photo views (labeled "View 1" through "View 6") keyed to the Viewshed Study figure, illustrate how the vegetative screenings would affect views of the project.

However, as the screening would not fully avoid or minimize the adverse effect, we suggest, in addition, that TVA implement two mitigation measures. First, TVA will provide updated information for the existing Earnest Farms Historic District NRHP registration form. Birdseye had proposed nominating the Braunhurst Farm to the NRHP. Unfortunately, there was little support among the landowners for having their property listed. Based on Birdseye's conversations with landowners, it does not appear possible to nominate Braunhurst Farm to the NRHP. However, TVA is prepared to update the existing NRHP registration form for the Earnest Farms Historic District. The updated information will include observations and data generated during TVAR's recent investigation, as well as additional information obtained during TVAR's background research that is not included in the original nomination.

Second, TVA will develop an educational driving tour guided by a pamphlet, and make it available to the public at a location in the area as a means of mitigating the adverse project effect. The pamphlet would describe Braunhurst Farm and Earnest Farms Historic District, and would be designed as a written guide to a driving tour of those properties. The pamphlet would be written by a professional historian or architectural historian, based on documentary research and informant interviews, and would contain photographs highlighting the history and architectural significance of these properties. TVA would secure an appropriate location to make the pamphlet available to members of the public (such as, tentatively, the nearby Davy Crocket Birthplace State Park or a local chamber of commerce). Given that Earnest Farms began operation in 1777 and Davy Crockett was born near this location in 1786, the driving tour would enhance the public's knowledge of, and appreciation for, the historic significance of the area.

Mr. E. Patrick McIntyre, Jr.
Page Four
July 8, 2015

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding historic properties within the proposed project's APE that may be of religious and cultural significance and are eligible for the NRHP.

Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your comments on TVA's:

- definition of the APE
- determination that no NRHP-eligible archaeological sites are present in the APE
- determinations of eligibility for the twelve newly identified historic architectural resources in the APE
- finding that the proposed undertaking would result in an adverse effect on Braunhurst Farm and Earnest Farms Historic District
- invitation to participate in an MOA with TVA for mitigation of the undertaking's adverse effects on historic properties in the APE

If you have any questions or comments, please contact Richard Yarnell by telephone at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones
Manager, Biological and Cultural Compliance
Safety, River Management and Environment
WT11C-K

SCC:CSD
Enclosures
cc (Enclosures):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210

TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON ROAD
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

Rec'd 7/28/15

July 22, 2015

Mr. Clinton Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, BROWN SWISS SOLAR PROJECT, CHUCKEY, GREENE COUNTY, TN

Dear Mr. Jones:

At your request, our office has reviewed the above-referenced cultural resources survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we find that the project area contains no archaeological resources eligible for listing in the National Register of Historic Places.

Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.

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

EPM/jmb

Recd. 8/7/15

TENNESSEE HISTORICAL COMMISSION
2941 LEBANON ROAD
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550

August 4, 2015

Mr. Clinton E. Jones
Tennessee Valley Authority
400 W. Summet Hill Dr.
Knoxville, Tennessee, 37902-1499

RE: TVA, BROWN SWISS SOLAR PROJECT, CHUCKEY, GREENE COUNTY

Dear Mr. Jones:

In response to your request, received on Thursday, July 9, 2015, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process.

Considering available information, we find that the project as currently proposed WILL ADVERSELY AFFECT PROPERTIES THAT ARE ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. You should now begin immediate consultation with our office. Pease direct questions and comments to Joe Garrison (615) 770-1092

Sincerely,

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

EPM/jvg

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

September 15, 2015

Ms. Najah Duvall-Gabriel
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

Dear Ms. Duvall-Gabriel:

TENNESSEE VALLEY AUTHORITY (TVA), FINDING OF ADVERSE EFFECT, BROWN SWISS SOLAR PROJECT, CHUCKEY, GREENE COUNTY, TENNESSEE (36.195557° N, 82.671539° W)

TVA proposes to enter into power purchase agreements (PPAs) with a subsidiary of Birdseye Renewable Energy (Birdseye), through the Renewable Standard Offer (RSO) program for the construction, operation, and maintenance of a photovoltaic power project near Chuckey in Greene County, Tennessee. TVA's RSO program offers pre-set prices (the "standard offer") and terms and conditions for power generated by selected renewable energy technologies. TVA would enter into PPAs with Brown Swiss LLC, a subsidiary of Birdseye, for their two ca. 10 megawatt (MW) solar arrays on adjacent tracts totaling ca. 120 acres. TVA has determined that the proposed PPAs constitute an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects on historic properties.

TVA has initiated consultation with the Tennessee State Historic Preservation Officer (SHPO) and federally-recognized Indian tribes regarding the undertaking's potential to affect historic properties, pursuant to 6 CFR Part 800.4(d)(1). Based on a cultural resources survey carried out in partial fulfilment of Section 106 of the National Historic Preservation Act (NHPA), TVA finds that no archaeological resources included or eligible for inclusion in the National Register of Historic Places (NRHP) are located with the undertaking's area of potential effects (APE). TVA finds that one NRHP-listed resource and two NRHP-eligible historic architectural properties are located within the APE. TVA finds further that the proposed undertaking would result in an adverse effect to two of these resources, NRHP-eligible Braunhurst Farm and NRHP-listed Earnest Farms Historic District. SHPO has agreed with TVA's adverse effect finding. Copies of the relevant consultation letters are enclosed.

To date, one consulted Indian tribe has responded to TVA regarding the undertaking. The United Keetoowah Band of Cherokee Indians in Oklahoma responded by email addressed to Patricia B. Ezzell, TVA's Tribal Liaison, on July 16, 2015. The email stated, "The United Keetoowah Band of Cherokee Indians in Oklahoma has reviewed your project under Section 106 of the NHPA, and at this time, have no comments or objections. If any human remains are inadvertently discovered, please cease all work and contact us immediately. In addition, the UKB reserves the right to re-enter consultation at any time regarding this project."

Ms. Najah Duvall-Gabriel
Page Two
September 15, 2015

We have enclosed one copy of the draft Phase I architectural survey report titled *A Phase I Cultural Resources Survey of the Brown Swiss LLC Proposed Solar Farm in Chuckey, Greene County, Tennessee* as documentation pursuant to 36 CFR § 800.11(e) supporting TVA's finding of adverse effect.

Pursuant to 36 CFR § 800.6(a) TVA shall consult further with the SHPO to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize or mitigate the adverse effect.

If you have any questions or comments, please contact Richard Yarnell by telephone at (865) 632-3463 or by email at wryarnell@tva.gov.

Sincerely,

Clinton E. Jones
Manager, Biological and Cultural Resources
Safety, River Management and Environment

SCC:CSD
Enclosures
(1) Letter from TVA to SHPO dated July 8, 2015.
(2) Letter from TN SHPO to TVA dated July 22, 2015
(3) Letter from TN SHPO to TVA dated August 4, 2015.
(4) One bound copy of the report, *A Phase I Cultural Resources Survey of the Brown Swiss LLC Proposed Solar Farm in Chuckey, Greene County, Tennessee*
cc (no enclosure):
Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

December 10, 2015

Mr. E. Patrick McIntyre, Jr.
Executive Director
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

MEMORANDUM OF AGREEMENT BETWEEN THE TENNESSEE VALLEY AUTHORITY (TVA) AND THE TENNESSEE STATE HISTORIC PRESRVATION OFFICER (SHPO) REGARDING THE BROWN SWISS SOLAR PROJECT IN GREENE COUNTY, TENNESSEE

Pursuant to recent communications between our offices[1], TVA has prepared a Memorandum of Agreement (MOA) to satisfy TVA's responsibility under Section 106 of the National Historic Preservation Act (NHPA) with regard to TVA's proposed Power Purchase Agreement with a subsidiary of Birdseye Renewables, Inc. for the construction and operation of a 20-MW solar farm in Greene County, Tennessee. We provided a copy of the draft MOA for your review on August 31, 2015.

Enclosed are one copy of the subject MOA with five signature pages. Please provide TVA with the signed signature pages. Upon receiving the signed MOA we will provide you with two final copies with all signatures, for your records. If you have any questions or comments, please contact Richard Yarnell in Knoxville at wryarnell@tva.gov or (865) 632-3463.

Sincerely,

Clinton E. Jones, Manager
Biological and Cultural Compliance
Safety, River Management and Environment

SCC:CSD
Enclosures
cc (Enclosures):
Brian Bednar, President
Birdseye Renewable Energy
1125 E. Morehead St., Suite 202
Charlotte, NC 28204

[1] Letters dated July 8, August 4, and October 19, 2015, and telephone conversations between Richard Yarnell and Dr. Joseph Garrison on September 14 and November 4, 2015.

MEMORANDUM OF AGREEMENT
BETWEEN THE TENNESSEE VALLEY AUTHORITY
AND THE
TENNESSEE STATE HISTORIC PRESERVATION OFFICER
REGARDING THE BROWN SWISS SOLAR PROJECT
IN GREENE COUNTY, TENNESSEE

WHEREAS, the Tennessee Valley Authority (TVA) proposes to enter into a power purchase agreement (PPA) with a subsidiary of Birdseye Renewable Energy (Birdseye), through the Renewable Standard Offer (RSO) and Solar Solutions Initiative (SSI) programs for the construction, operation, and maintenance of a 20-Megawatt photovoltaic power project near Chuckey in Greene County, Tennessee (the Brown Swiss Solar Project, or "Undertaking"; shown in Appendix A); and

WHEREAS, pursuant to 36 CFR § 800.4(a)(1), TVA has determined (in consultation with the Tennessee State Historic Preservation Officer, or SHPO) that the area of potential effects (APE) for archaeological resources consists of the 124-acre area to be leased by Birdseye, which includes the ca. 120-acre solar array project site, ca. 1500 linear feet of 75-ft wide right-of-way (ROW) for an electrical connection, and a ca. 2-acre substation site; and

WHEREAS, pursuant to 36 CFR § 800.4(a)(1), TVA has determined (in consultation with SHPO) that the APE for this Undertaking, for historic architectural resources, consists of the area within a 0.5-mile radius surrounding the ca. 120-acre project site; and

WHEREAS, pursuant to 36 CFR § 800.4(a), TVA has completed an archaeological survey of the archaeological APE and a survey of above-ground architectural resources within the architectural APE, and has consulted with SHPO the findings and determinations of the investigations; and

WHEREAS, the archaeological survey identified four archaeological sites (40GN333, 40GN334, 40GN335, and 40GN336) and four isolated finds of archeaological material, and TVA and SHPO agree that all four sites and four isolated finds are ineligible for inclusion in the National Register of Historic Places (NRHP); and

WHEREAS, TVA carried out a historic architectural investigation within the APE and identified one NRHP-listed property: the Earnest Farms Historic District, which was listed on the NRHP in 2000 under Criterion (a) of 36 CFR Part 60.4 for its association with the early settlement patterns of East Tennessee and its agricultural significance as the oldest century farm in the state, and under Criterion (c) for its architectural significance, and which TVA and SHPO agree remains eligible as a NRHP-listed property; and

WHEREAS, the architectural investigation also identified two previously undocumented historic properties: IS-2 (ca. 1930 bungalow), which TVA and SHPO agree is eligible under Criterion (c) for its local significance as a representative example of bungalow-

influenced architecture; and IS-4 (Braunhurst Farm), which TVA and SHPO agree is eligible under Criterion (c) for its local significance as a representative example of a mid-twentieth century farmstead anchored by a two-story Folk Victorian style residence, and as a contributing resource to the Earnest Farms Historic District; and

WHEREAS, TVA has determined, in consultation with SHPO, that the proposed undertaking would result in adverse effects to the NRHP-listed Earnest Farms Historic District and NRHP-eligible Braunhurst Farm; and

WHEREAS, due to the scale of the project and its location on one of the highest topographic locations within the APE, TVA is unable to identify any avoidance measures that would be technically feasible and economically prudent; and

WHEREAS, pursuant to 36 CFR § 800.6(a)(1), TVA has notified the Advisory Council on Historic Preservation ("Council") of the adverse effect finding by providing documentation specified in 36 CFR § 800.11(e), and the Council has responded by informing TVA of their decision not to become involved in reviewing this Section 106 case; and

WHEREAS, pursuant to 36 CFR § 800.3(f)(2), TVA has consulted on a government-to-government basis with the Cherokee Nation, Eastern Band of Cherokee Indians, Kialegee Tribal Town, Muscogee (Creek) Nation, Thlopthlocco Tribal Town, and the United Keetoowah Band of Cherokee Indians in Oklahoma regarding the Undertaking's potential to affect historic properties that are of religious and cultural significance to federally-recognized Indian tribes, and none of the consulted tribes identified such properties or objected to the Undertaking;

NOW, THEREFORE, TVA and SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations to satisfy TVA's responsibility under Section 106 of the National Historic Preservation Act (NHPA) to mitigate adverse effects on historic properties that result from the Undertaking.

STIPULATIONS

TVA shall ensure that the following stipulations are implemented:

I. MINIMIZATION OF ADVERSE EFFECTS ON EARNEST FARMS HISTORIC DISTRICT AND BRAUNHURST FARM:

Visual Screen

A. Birdseye shall construct a visual screen surrounding the Brown Swiss Solar Farm.

B. The visual screen will consist of the planting of two or more native plant species in multiple rows surrounding those portions of the project where such screening, when mature, will be effective in reducing or minimizing the adverse effect.

C. The visual screen will follow a conceptual plan that has been reviewed and approved by the Signatories.

II. MITIGATION OF ADVERSE EFFECTS ON EARNEST FARMS HISTORIC DISTRICT AND BRAUNHURST FARM:

A. Update to the Earnest Farms Historic District NRHP registration form.

1. TVA shall update the existing Earnest Farms Historic District NRHP registration form (NPS 10-900), originally submitted to the National Park Service in 2002, with information that was gathered during the recent architectural survey and related background research.

2. The additional information will include observations and data generated during the architectural investigation, and any new information obtained during the background research that is not included in the original nomination and that would enhance the value of the registration form.

B. Educational Driving Tour

1. TVA will develop an educational driving tour guided by a pamphlet and make the pamphlet available to the public at a location in the area.

2. The pamphlet will be written by a professional historian or architectural historian, based on documentary research and informant interviews, and will be professionally designed.

3. The pamphlet will contain illustrations highlighting the history and architectural significance of Braunhurst Farm and Earnest Farms Historic District; a map showing the locations of points of interest within these properties that can be viewed from public roads; and narrative text describing those properties and presenting the history of the area from the earliest Euro American settlement to the 20th century.

4. The pamphlet will be organized as a written guide to a driving tour of selected points of interest within Braunhurst Farm and Earnest Farms Historic District.

5. TVA will secure an appropriate location to make the pamphlet available to members of the public, who will be encouraged to take a copy free of charge and conduct their own driving tour, guided by the numbered points of interest in the pamphlet.

III. SCHEDULE

A. Visual screen

TVA shall submit Birdseye's conceptual site plan, showing the proposed visual screen, to SHPO within 30 (calendar) days of the execution of this MOA. SHPO shall provide any comments within 30 days of receipt of the conceptual site plan. TVA and Birdseye shall take SHPO's comments into consideration when finalizing the conceptual site plan. Birdseye may begin planting the visual screen at any time during the construction phase of the project, and shall ensure that the vegetation has been planted within 90 days of completion of construction of the Brown Swiss Solar Farm.

B. Updating the Earnest Farms Historic District National Register Nomination Form

TVA shall submit the updated NRHP nomination form (NPS 10-900) to SHPO for comment within 60 days of the execution of this MOA. SHPO shall provide any comments within 30 days of receipt of the updated NRHP nomination form, and TVA shall take the comments into consideration when finalizing the form. TVA shall coordinate the updating of the form with the Tennessee Historical Commission's National Register Coordinator, and shall submit the final updated NRHP nomination form to SHPO and to the National Park Service within 90 days of receiving SHPO comments, or within 120 days of sending the draft updated NRHP nomination form to SHPO if SHPO does not provide comments.

C. Educational Driving Tour

TVA shall submit a draft of the educational driving tour pamphlet to SHPO for comment within 60 days of the execution of this MOA. SHPO shall provide any comments within 30 days of receipt of the pamphlet, and TVA shall take the comments into consideration when finalizing the pamphlet. TVA shall ensure that the final pamphlet is submitted to SHPO within 90 days of receiving SHPO comments, or within 120 days of sending the draft pamphlet to SHPO if SHPO does not provide comments. TVA shall secure a location for distribution of the pamphlet, and shall begin providing copies of the pamphlet to the public, within 60 days of the completion of project construction.

The schedules outlined in Part III. A-C are based on calendar days.

IV. AUTHORITY

The TVA Federal Preservation Officer, or the designee thereof, shall act for TVA in all matters concerning the administration of this agreement.

V. DURATION

This MOA will be in effect for three (3) years from the date of its execution unless all signatories mutually agree to extend the duration of the MOA.

VI. REPORTING OF UNANTICIPATED EFFECTS

If unanticipated effects on historic properties occur during the Undertaking, TVA shall implement the Plan for Reporting Unanticipated effects included as Appendix B of this MOA.

VII. DISPUTE RESOLUTION

Should any signatory to this MOA object at any time to any actions proposed or to the manner in which the terms of this MOA are implemented, TVA shall consult with such party to resolve the objection. If TVA determines that the objection cannot be resolved, TVA, or the objecting party, may seek guidance from the Council pursuant to 36 CFR § 800.2(b)(2). TVA will take any Council comment provided in response to such a request into account in resolving any

such dispute. The Signatories are responsible for carrying out all actions under this MOA that are not the subject of the dispute.

VIII. AMENDMENTS

The signatories to this agreement may agree to amend the terms of this agreement. Any such amendment shall become effective upon its signing by all signatories, and the final amendment shall thereafter be appended to this agreement.

IX. TERMINATION

If any Signatory to this MOA determines that the terms cannot be or are not being carried out, that party shall immediately consult with the other party to attempt to develop an amendment in accordance with Stipulation VII of this agreement. If the agreement is not amended within thirty (30) days of the initiation of such consultation (or another time period agreed to by all signatories), any Signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the Undertaking, TVA must either (a) execute a different MOA, or (b) request, take into account, and respond to the comments of the Council under 36 CFR § 800.7. TVA shall notify SHPO as to the course of action it will pursue.

If Stipulations I and II have not been implemented within 3 years from the date of execution, this MOA will be terminated unless all signatories mutually agree to extend the duration of the MOA.

EXECUTION of this Memorandum of Agreement (MOA) by TVA and the SHPO, the submission of documentation and filing of this MOA with the Council, and implementation of its terms evidence that TVA has, in accordance with Section 106 of the National Historic Preservation Act, taken into account the effects of this Undertaking on Historic Properties and afforded the Council an opportunity to comment. TVA will submit a copy of the executed MOA, along with the documentation that is specified in 36 CFR § 800.11(f), to the Council.

SIGNATORY

TENNESSEE VALLEY AUTHORITY

By: _____ Date: _____
Wilbourne C. Markham, Jr.
Director, Environmental Permitting and Compliance, Safety, River Management, and Environment; and Federal Preservation Officer

SIGNATORY

THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: _____
E. Patrick McIntyre, Jr., Tennessee State Historic Preservation Officer

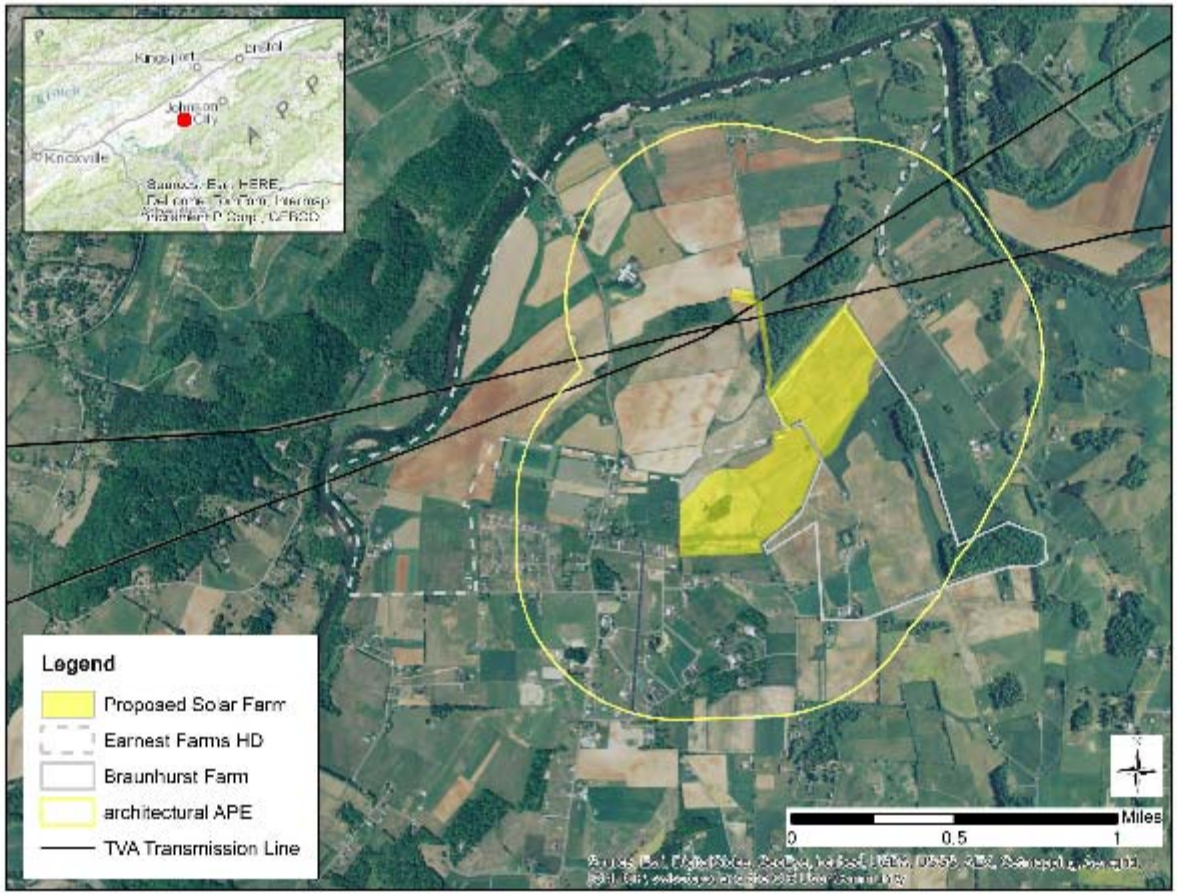
INVITED SIGNATORY

BIRDSEYE RENEWABLE ENERGY

By: _____ Date: _____
Brian Bednar, President

Appendix A

Brown Swiss Solar Project Site, Project Location


Legend
Proposed Solar Farm
Earnest Farms HD
Braunhurst Farm
architectural APE
TVA Transmission Line
Miles
0
0.5
1

Appendix B

Plan for Reporting Unanticipated Effects

An Unanticipated Effect is any physical damage to any part of an historic property that was not foreseen and not expected, that occurs during any activity that is part of the Undertaking.

TVA will ensure that on-site personnel responsible for supervising and overseeing the Project are aware of their responsibility to report any Unanticipated Effect, and to do so in a timely manner.

In the event of an Unanticipated Effect, the on-site supervisor or the Principal Engineer overseeing the Project will contact TVA Cultural Compliance immediately. Contact information is provided below.

TVA Cultural Compliance will evaluate whether the Unanticipated Effect constitutes an adverse effect to an historic property. Cultural Compliance staff will utilize whatever methods and means necessary to make this evaluation, and will make the evaluation as expeditiously as possible.

If TVA Cultural Compliance determines that the Unanticipated Effect constitutes an adverse effect to an historic property (pursuant to 36 CFR § 800.5(a)(1)), then TVA will follow the procedures under 36 CFR § 800.13(b)(3) (for resolution of adverse effects that occur after the agency official has completed the Section 106 process without establishing a process to plan for subsequent discoveries):

1. TVA shall notify the SHPO and the Advisory Council within 48 hours of discovering the Unanticipated Effect. The notification will summarize TVA's earlier determination on the eligibility of the affected historic property for inclusion for the National Register of Historic Places (NRHP) and will include one or more proposed actions to resolve the adverse effect.

2. TVA will allow 48 hours for SHPO and the Advisory Council to respond.

3. TVA shall take into consideration the recommendations of SHPO and the Advisory Council regarding the NRHP eligibility of the historic property, and the proposed actions, and shall then carry out appropriate actions.

Contact information:

TVA Business Unit	Name, title	Phone number	Email
Cultural Compliance	Richard Yarnell, Archaeologist	(865) 632-3463	wryarnell@tva.gov
Natural Resources Compliance	Bo Baxter, Manager	(865) 632-3360	jtbaxter@tva.gov
Biological & Cultural Compliance	Clint Jones, Manager	(865) 632-3404	cjones5@tva.gov