Case No. 2021-00235
Russellville Solar, LLC
Responses to Sitting Board's Second Request for Information

1. The Tennessee Valley Authority (TVA) webpage for Logan County Solar project lists documents that have been submitted in that proceeding. Submit any documents that have been submitted in TVA proceedings that have not yet been submitted in this proceeding. Including communication with the U.S. Fish and Wildlife Service, communication with the Kentucky Heritage Council, a Wetland Definition Report dated July 31, 2019, and a Historic Architecture Survey and Assessment Draft Report dated March 29, 2022.

Response: Filed separately as "Attachment 1 [file name] are the documents that have been provided to or by TVA to date in support of the National Environmental Policy Act environmental review for the project, including:

- Wetlands Delineation Report, dated July 31, 2019;
- Approved Jurisdictional Determination from US Army Corps of Engineers, dated January 27, 2020;
- Phase I Environmental Site Assessment, Russellville Solar, dated June 11, 2021; (previously filed with the Application as SAR Exhibit C)
- National Historic Preservation Act Section 106 consultation with the Kentucky Heritage Council (KHC) and federally recognized Native American tribes consulting with TVA:
    - Initiation of consultation, KHC and tribal letters dated April 16, 2021, and April 19, 2021, respectively, and
    - Survey report consultation, KHC, dated April 6, 2022; and
- Phase I Cultural Resource Survey, 1,585 Acres for the Russellville Solar Farm, dated February 16, 2022;
- Historic Architecture Survey and Assessment of Effects for the Proposed Russellville Solar Farm, dated March 29, 2022 (filed confidentially);

- Vegetation and Wildlife Assessment, dated February 16, 2022;
- Endangered Species Act Section 7 consultation with the US Fish and Wildlife Services, dated April 12, 2022.

Witness: Harriet Richardson Seacat, HDR

2. The transmission line to be utilized by Russellville Solar is owned by TVA. The electric distribution system in the project area is served by the TVA. Provide the TVA best management practices for designing, constructing, and operating the substation, switchyard, and the solar facility.

Response: Attached below is a TVA Transmission Planning Document that includes the defined process and basic guidelines for designing, constructing, and operating the TVA facilities.

Witness: Joshua Smith, Silicon Ranch

TENNESSEE VALLEY AUTHORITY

TRANSMISSION PLANNING

FACILITY CONNECTION REQUIREMENTS

END USER FACILITIES

Revision 5

November, 2020

Prepared by: Transmission Planning Department

Approved by: Date: November 19, 2020

Christopher Mark Ethridge

General manager, Transmission Planning

Current Revision Description

Rev	Date	Description
0	April 19, 2004	Initial Issue
1	April 27,2007	Converted several previous references to appendices. Updated reference to NERC Reliability Standard FAC-001. Minor editorial changes.
2	March 30, 2010	Various revisions to include greater detail, replaced obsolete Appendix A (high-side backup protection sketch) with a form for requesting new delivery point information. Appendix E (Power quality guideline) was removed from the Appendix and is now a referenced document.
3	September 30, 2011	Reviewed for FAC 002-1 compliance effective October 1st, 2011 and revised section 3.2 “System Impact Study” to add new TPL Standards. Revised section 7 to add reference to new TPL standards.
4	November 2, 2017	Various revisions to include greater detail - updated language covering TVA ownership, customer drawings and customer responsibilities. Also updated Power Quality (PQ) section to include voltage imbalance, voltage flicker and harmonic current distortion tables.
5	November 19, 2020	Updated default switching configuration at delivery points, updated Power Quality (PQ) section 4.14.

Table of Contents

Table of Contents

1.0 INTRODUCTION

In accordance with the TVA Act and subsequent statutes and laws, TVA provides electrical power to its customers within the TVA region. Both wholesale and retail deliveries of power to customers within the TVA service area are provided at delivery points across TVA's transmission system. TVA provides delivery points to other utilities, where TVA transmission lines traverse their service areas, as well as negotiate the provision of delivery points from neighboring utilities for TVA customers when needed.

All types of load deliveries from the TVA transmission system have the same technical requirements; however, funding justification, cost responsibilities, and approval procedures differ. This document will address the technical and operational coordination of new delivery points to be supplied from the TVA transmission system regardless of whether the requestor is a TVA power distributor, existing or new industrial customer, another utility, or even TVA itself. Technical and operational requirements for delivery points for TVA customers that are to be supplied from neighboring utilities will be coordinated with the interconnecting utility in accordance with appropriate guidelines, policies, and any existing interconnection agreements that it may have with TVA. Requestors of new delivery points will be provided details regarding cost responsibilities and approval procedures, if needed.

2.0 SCOPE

This document covers the Facility Connection Requirements for new delivery points (End-user facilities) on the TVA transmission system in order to promote the safe operation, integrity, and reliability of the TVA transmission system as well as ensure compliance with NERC Reliability Standards, SERC Supplements, and TVA planning criteria.

3.0 PLANNING NEW DELIVERY POINTS

3.1 Notification

Requestors of new delivery points to be supplied from the TVA transmission system should notify TVA as early as possible to allow time for appropriate studies and facilitate coordination with area plans. Existing TVA power distributors and directly-served industrial customers should contact their Customer Service Manager or Industrial Marketing Representative. Other utilities requesting a TVA delivery point should contact TVA's Stakeholder Services and Contracts Group in accordance with TVA's Transmission Service Guidelines. New industrial customers should contact the local power distributor or TVA's Economic Development office. Formal request should be made either in writing to the appropriate contact person or be made in an official power supply meeting with TVA.

3.2 System Impact Study

TVA will perform a system impact study to assess the impact for any proposed new delivery point to be supplied from TVA's transmission system. The study may include, but is not limited to, loadflow, short circuit, dynamic stability, and Electro-magnetic Transients Program (EMTP) studies. System impact studies will determine if the proposed new load will cause a violation of TVA planning criteria under both normal and contingency conditions in accordance with NERC Transmission Planning Standards (TPLs)regarding (a) thermal overload of transmission facilities, (b) excessive voltage variations, and (c) transfer capabilities with other transmission systems. If a system impact study indicates an adverse impact on a transmission system interconnected to TVA's, then TVA will notify the neighboring system and coordinate its study results as needed.

If any violations of TVA's planning criteria are identified in the study, then any needed upgrades to the transmission system will be identified as part of the technical coordination phase of the New Delivery Point.

3.3 Information Required

Customers are required to furnish information during the planning phase of a new delivery point regarding the nature of the load to be supplied as well as certain design parameters of the proposed connected facilities. Information required will include, but is not limited to:

1. Substation name

2. Contact person (name, address, telephone, email)

3. Proposed location of station (shown on General Arrangement (GA) diagram)
4. Preferred schedule of new delivery point
5. Preferred supply voltage
6. One-line diagram of proposed station
7. Transformer data
8. Transmission line configuration, impedance, and thermal ratings.
9. Peak load anticipated (initial and 10-year projection)
10. Power factor
11. Future/ultimate plans
12. Special requirements (e.g., motor starting)
13. Characteristics of harmonic- or flicker-producing loads (arc furnaces, fluctuating load, etc)
14. Preferred connection configuration
15. On-site generation plans

A form for conveying the required information is found in Appendix A. Additional information will be required during the technical scoping phase of the proposed New Delivery Point facilities.

3.4 Delivery Point Location

TVA must agree with the actual physical location of the new delivery point. The site of the proposed delivery point should be coordinated with TVA. A joint site visit by TVA and the Customer is recommended to review site specific issues. Customers are advised not to make actual purchase of property until the site is reviewed by TVA for suitability.

3.5 Delivery Point Configuration

New loads may be connected to TVA's transmission system in a variety of configurations. TVA Interconnection Facilities will be generally based on the location, size, and type of load. Customers at new delivery points may participate in enhanced facilities for improved reliability at their cost.

A typical new delivery point to the TVA transmission system can involve the tapping of a transmission line. The configuration of tapped stations will be determined on a case-by-case basis. TVA would typically provide two remotely controlled switches with motor operated disconnects (MODs) at tapped stations. TVA may provide two manually-operated sectionalizing switches at tapped stations where MODs are not warranted. Enhanced switching devices, such as Line-Rupters, circuit switchers, or circuit breakers may be provided at the Customer's cost if desired.

A transmission line may be looped through the station, such that the transmission line's power flow travels across the Through Bus facilities in the station. Under this configuration, the Through Bus will need to be appropriately sized to handle system power flows. Any switching devices (circuit breakers, interrupters, switches, etc) included in the Through Bus facilities must be owned, operated and dispatched by TVA. Also, TVA will be required to own the Through Bus for system flows and NERC Bulk Electric System (BES) requirements (exceptions may be Nashville Electric Service or Memphis Light Gas and Water systems since they are registered entities).

Other new delivery points may involve connection to existing substations or involve new switching stations and will be coordinated with the Customer as needed.

4.0 TECHNICAL COORDINATION

TVA and Customer will coordinate the various technical issues related to the New Delivery Point as follows.

4.1 Scoping Workshop

For all new delivery point projects, TVA will conduct a Scoping Workshop to initiate the design and construction phases of the project. Coordination, review, and approval of the technical scope of the new delivery point facilities is performed and documented in the workshop activities. A project schedule is also determined. TVA will provide the Customer with a Specification Diagram and Communication Specification Diagram depicting the power and telecommunications facilities agreed upon in the workshop. The Scoping Workshop will not be conducted until after the Customer completes property purchase and provides a station one-line diagram and GA diagram. A Scoping Checklist will be followed in a scoping workshop.

4.2 System Protection and Other Controls

The proposed New Delivery Point shall not adversely affect TVA's ability to protect its transmission system as well as not unduly impact the reliability of other area customers. The following relay and protective issues shall be coordinated as needed.

1. Review of the relay settings for a new delivery point by TVA will be required to ensure compatibility of TVA and Customer protection schemes.

2. Customer shall provide TVA a copy of the manufacturer's test report (including zero sequence data) for any power transformer it plans to install in its facilities. TVA and Customer shall coordinate proposed transformation impedance, and winding configuration to ensure no adverse impact to TVA's protective scheme for the transmission system. Customer's use of an autotransformer must be approved by TVA. When 161-kV grounded-wye connected transformers are to be installed, TVA shall determine need and size of neutral reactors.

3. Standard protection requirements for Customer's Facilities include backup protection for the high-side tripping. This should be in the form of two fault-interrupting devices in series for each transformer connection. Typically two circuit switchers are used, but a circuit breaker and circuit switcher combination or two circuit breakers (for high fault levels) could be used. For multiple transformer bank installations, a common interrupting device could be used for the backup protection if desired. Exceptions to this requirement may be granted for special situations. The secondary protection afforded by a redundant interrupting device prevents other area customers from adverse impact should primary tripping fail during fault conditions.

4. TVA will review the plans for new delivery point facilities to ensure that appropriate backup protection is provided as well as compatibility with TVA's protective schemes in effect for the specific location. Although TVA will point out any discrepancy in protection that is noticed, TVA's review should not be construed as an endorsement for adequacy for the Customer's own needs. It should be noted that TVA does not provide backup protection from remote line terminals for Customer transformer banks.

5. Requestors of new delivery points are referred to "Typical Terms and Conditions for New Delivery Points" (Appendix D).

6. Underfrequency Load Shed Program - In accordance with NERC Standards and SERC's regional supplement, TVA expects customers of its transmission system to participate in TVA's underfrequency (UF) load-shed program as described in PSO-SPP-9.5.001Underfrequency Load Shedding. TVA will provide a pre-wired panel with an underfrequency relay and associated equipment and Customer shall install. Customer-owned relays shall not be used as part of TVA's UF load shed program due to difficulties in program oversight and maintenance activities.

7. At new delivery points where TVA has line circuit breakers or other automatic devices and the Customer has stepdown transformation, an exchange of secondary circuits and trips circuits between TVA and Customer may be required.

8. If generation sources are installed either at the Customer's facilities or within the Customer's distribution system, then such generation facilities must be in accordance with "Small Generator Interconnection Procedures (SGIP)" for generating facilities no larger than 20 MW and "Standard Large Generator Interconnection Procedures (LGIP)" for generating facilities that exceed 20 MW

9. On TVA transmission lines that are protected with high-speed pilot protection, it is possible especially with large wye-connected grounded or autotransformers, that the remote pilot tripping elements protecting the transmission line will "see" faults on or near the distributor's subtransmission and/or distribution buses, which would result in erroneous relay operation of TVA transmission lines. In these cases, TVA may need to install a wave trap, coupling capacitor voltage transformer (CCVT), carrier transmitter, and blocking relay in the Customer's Facility.

4.3 Drawing Requirements

Customer shall provide a one-line diagram and general arrangement plan for the Facility. A relay plan may also be needed if sufficient relay information is not included in the one-line diagram. The drawings provided should depict equipment data, breaker and switch configuration, and protective relay zones. The transformation planned needs to be appropriately described by including capability ratings, winding configuration, voltage levels and available tap ranges.

4.4 Equipment Ratings

Customer should determine equipment ratings such as load carrying capacity and insulation ratings for its Facility in accordance with Good Utility Practice. TVA does not dictate the ratings of Customer-owned equipment except as they directly affect the performance of the TVA transmission system. Through Bus facilities must be of appropriate capability to handle anticipated transmission line flows and/or be of equivalent capacity as the connected transmission line.

4.5 System Grounding

The proper use of grounding at electrical stations will ensure personnel safety as well as limit damage to equipment during normal and fault conditions. Safety is of upmost importance to TVA and adequate grounding is required at any facility that is connected to TVA's transmission system. Accordingly, Customer's Facility must

have a grounding system that solidly grounds all metallic structures and equipment in accordance with the ANSI/IEEE 80, IEEE Guide for Safety in AC Substation Grounding as well as the National Electrical Safety Code.

The interface between TVA and Customer at the point of interconnection will require the coordination of grounding connections such as transmission line and substation overhead shield wires, ground grids, fencing, cable shields, etc. If the Facility is physically near another station, TVA recommends that the two ground grids be connected with conductors of adequate capacity to handle fault currents and sufficiently control voltage rise on the ground grids. TVA must approve any connection to a TVA ground grid.

If the Facility is close to another station and the ground grids need to be isolated for any reason, then the Customer must demonstrate that the Facility is properly isolated and in compliance with all applicable codes and standards. Fiber optic cables can be used for control and telecommunication circuits in order to maintain isolation between the stations. Isolation panels can be used if needed for connections to existing fences.

If Customer constructs any transmission line to be connected to TVA's transmission system, then overhead shield wires are required as well as adequate grounding at each structure in accordance with the National Electrical Safety Code. TVA requires that structure to ground resistance levels conform to TVA's standards as provided in TRANS-ENG-DES-09.520.2 Electrical Design Considerations. Structure footing resistance readings shall be taken according to form TVA 20405 as shown in the Transmission Line Construction Manual for Grounding Improvements (TC-LCS-06.003.08) during construction of the new transmission line. As necessary, grounding improvements using driven rods and counterpoise will be made such that the maximum value of the footing resistance will not be exceeded.

4.6 Insulation and Insulation Coordination

Insulation coordination is the selection of insulation strength. Insulation coordination must be done properly to ensure electrical system reliability and personnel safety. Basic Surge Level (BSL), surge arrester, conductor spacing and gap application, substation and transmission line insulation strength, protection, and shielding for Customer's Facility shall be in accordance with industry standards, documented and available for TVA review.

4.7 Standards and Review

Customer's Facility shall meet standards of Good Utility Practice, shall be capable of continuous supply from the TVA transmission system, and shall include one or more switching devices capable of disconnecting the Facility from the TVA Interconnection Facilities. Said switching devices must allow a means to physically and visibly isolate the new delivery point facility from TVA's transmission system. The Facility shall be capable of satisfactory coordination with any protective, monitoring, and control equipment installed by TVA and shall be consistent with Customer's one-line diagram as reviewed and approved by TVA.

TVA-installed Interconnection Facilities shall likewise be designed and constructed in accordance with Good Utility Practice and plans and specifications will be consistent with TVA's Specification Diagram and Communication Specification Diagram as reviewed and coordinated with the Customer.

Any proposed variation of agreed upon scope of the new delivery point facilities by either Customer or TVA shall be appropriately coordinated. Reasonable notice for changes must be provided or schedule delay may result.

4.8 Provisions for Future Change

Both TVA and Customer shall recognize that future changes in the TVA Interconnection Facilities and the Customer's Facility may be required. Reasonable notice and adequate time should be provided so as to ensure proper coordination of plans. Initial development of New Delivery Point Facilities should consider an ultimate configuration to as much extent as possible.

4.9 Metering and Telecommunications

Revenue metering shall be required as appropriate for new delivery points and in accordance with "Terms and Conditions - New Delivery Points" (Appendix B), which is a standard attachment to new delivery point agreements. Revenue metering at new delivery points shall comply with the applicable provisions of TOM-FTM-6-METR-003 Rev 00002 "TVA Revenue Metering Guide for Customer-Owned Substations." For new delivery points involving three-winding transformation in which all supplied loads are located at other metered stations, then revenue metering at the new station may not be needed. If the load is not metered at the point of delivery, TVA will compensate the revenue metering to take into account the electrical impedances of equipment located between the meter location and the point of delivery. Such loss compensation will be added to the billing for that load. Manufacturer's test data will be required for transformers that are modeled for loss compensation. Electrical parameters for other components, (transmission lines, voltage regulators, reactors, etc.) may be needed as well.

TVA will make the following available to customers at new delivery points: (1) remote access to metering data (provided a telephone line is provided by customer), (2) metering pulses, and (3) access to metering currents and potentials (with restrictions) for customer parallel metering or other monitoring devices as explained in the revenue metering guidelines.

If a delivery point for a TVA customer is to be supplied from another utility, then additional metering requirements will be needed to accommodate the need for real-time meter data for dynamic scheduling. There will be similar real-time data needed if another utility requests delivery from the TVA transmission system. The additional metering and telecommunication requirements are provided in TRANS-SPP-06.012 R2 – Metering Requirements for Generation, Physical Tie Lines, Pseudo-ties, and Dynamic Schedules, but would also be subject to the interconnection agreement between TVA and the other utility for the delivery point.

For special circumstances, such as unusual load operating conditions, TVA may require the Customer to provide equipment necessary to supply TVA with communications data points or signals for load control, load monitoring, load projection, or equipment status monitoring.

4.10 Voltage, Reactive, and Power Factor Control

New Delivery Point Facilities should be designed to operate within reasonable voltage variations provided by TVA's transmission system. TVA strives to operate its transmission system to conform to contractual delivery point voltage levels, which are as follows: Under normal operating conditions, delivery point voltages provided to TVA power distributors should fall within three percent above or below the normal operating delivery voltage, which for deliveries of 46-kV and higher, should be no more than five percent higher or lower than the nominal voltage. For industrial customers during normal operating conditions, the delivery point voltage should be within seven percent above or below the normal operating voltage. New delivery point facilities should have tap ranges and regulation equipment necessary to operate within these voltage limits. However, these contractual voltage levels do not apply to temporary abnormal system conditions, which can result in much lower or higher voltages. Consequently, the delivery facilities should be designed for protection outside these contractual voltage levels. TVA strives to limit its transmission voltages to no less than 95 percent of nominal voltage during single contingency conditions conforming to TPL events.

Customers at new delivery points should operate their facilities such that the power factor at the delivery point is never less than 0.95 lagging at all times. During the lowest 60-minute consecutive demand period of each month, Customer's power factor should not go leading. Minimum demand periods of less than 25 percent of the monthly peak demand are excluded from leading power factor requirements. Any operation outside of these power factor limits will result in reactive billing penalties.

Additional reactive power limits are imposed on certain industrial customers due to load size and operating characteristics. Such “non-conforming” loads will be required to maintain a power factor of not less than 90% lagging or leading at the delivery point.

4.11 Generation Control

New Delivery Points may involve some form of distributed generation or co-generation and, if so, must conform to LGIP and SGIP guidelines, Facilities Connection Requirements: Generation and Transmission, and Energy Supply Facility Interconnection Requirements as outlined in the Generation’s FAC-001 procedures.

4.12 Supervisory Control and Data Acquisition (SCADA)

TVA typically does not require remote control ability or remote indication of Customer’s facilities at new load delivery point. However, where TVA installs or has operational control of line breakers or motorized switching devices, SCADA will be provided by TVA. In such cases, remote control and/or indication by TVA of Customer facilities may be desirable. Also, for large industrial loads, SCADA facilities may be required for coordination of loading issues.

4.13 Short Circuit Conditions

New delivery point facilities must be designed to withstand maximum short circuit conditions provided by the TVA transmission system. During the scoping phase for a new delivery point project, TVA will provide both present and future fault current data anticipated.

4.14 Power Quality

New loads connected to the TVA transmission system must not adversely affect TVA’s ability to provide an acceptable level of power quality to other connected loads. Voltage unbalance, flicker, voltage change, harmonic distortion, temporary over or under-voltages and transient over-voltages can adversely impact other loads. New loads must adhere to the following power quality criteria. A general summary of these requirements include:

(i) Voltage Unbalance – Customer facilities shall limit unbalanced current injection levels such that the voltage unbalance is maintained per IEC 61000-3-13 entitled “Assessment of Emission Limits for the Connection of Unbalanced Installations to MV, HV and EHV Power Systems”, as such standard may be revised, modified, or replaced from time to time. The Customer’s facility is responsible for protection from inadvertent phase unbalance or single phasing in the TVA transmission system’s voltage.

(ii) Voltage Flicker – Customer facilities shall limit voltage fluctuations (flicker) at the Point of Common Coupling (PCC) to acceptable levels consistent with IEEE 1453 entitled “Recommended Practice for Analysis of Fluctuating Installations on Power Systems”, as such standard may be revised, modified, or replaced from time to time.

(iii) Voltage Change – Customers shall limit rapid voltage changes (RVC) due to infrequent events such as motor starting, capacitor switching, transformer energization, etc. to levels consistent with Table 3 of IEEE 1453 entitled “Recommended Practice for Analysis of Fluctuating Installations on Power Systems”, as such standard may be revised, modified, or replaced from time to time.

(iv) Harmonic Distortion – Customer facilities shall limit production of total harmonic current distortion (THCD) and individual harmonic current distortion injected into the TVA transmission system to the levels specified in Tables 2 through 5 as applicable in IEEE Standard 519 entitled “Recommended Practice and Requirements for Harmonic Control in Electric Power Systems”, as such standard may be revised, modified, or replaced from time to time.

(Exceptions to these requirements may be considered by TVA on an individual basis).

5.0 CONSTRUCTION OF NEW DELIVERY POINT FACILITIES

Construction of New Delivery Point facilities should conform to Good Utility Practice and be implemented in a safe manner.

5.1 Customer Responsibilities

During the construction phase of the new delivery point project, TVA expects the Customer to:

1. Install metering CT’s, VT’s, test boxes, control cable (all of which are provided by TVA except in the case of metal-clad switchgear which is explained in the metering guidelines).

2. Provide and install all conduit required by TVA for metering, SCADA, and/or automatic control schemes.

3. Cooperate in the installation of TVA-provided sectionalizing switches on station pulloff structures or other structures as deemed appropriate.

4. Install TVA-provided underfrequency relays and associated auxiliary relays.

5. Install TVA-provided wave trap if delivery point and station configuration requires the wave trap to be located within Customer facilities.

6. Provide 120-volt ac service to TVA revenue metering, monitoring, SCADA, and switching facilities as required.

7. Provide AC & DC service to TVA motorized switching devices as required.

8. Participate in the connection between TVA transmission system ground (static) wire and Facility's overhead static wire if appropriate.

9. Provide panel space in customer switch house for relaying and telecommunications equipment.

Other participation in the construction of the facilities by the Customer may be needed for special situations.

5.2 Point of Interconnection

The typical transition point between TVA Interconnection Facilities and Customer Facilities will be at the jumper connection of the station's pulloff structure if the new facilities are supplied by a TVA transmission line connection. TVA will provide and install the new transmission line connection, including the complete dead-end assembly and all hardware to attach to the Customer's pulloff structure. The jumper between the transmission line and the facility represents the beginning of the substation facilities and where the facility ownership by the Customer begins. For delivery points where the ownership transition is made within a switchyard, such transition point shall be mutually agreed upon between TVA and Customer.

5.3 TVA Equipment Located on Customer's Facility

Customer is required to allow permission to TVA for locating any required transmission line, static wire, or switch structures and associated guys on Customer's property. TVA will coordinate the plans for any such facilities with Customer for its review and approval.

5.4 Inspection Requirements

Prior to energization, TVA will inspect and review all TVA-provided and TVA-installed equipment in the Interconnection Facilities and the Customer's Facility in accordance with TVA's Construction Standards. Customer shall inspect and review its Facility in accordance with Good Utility Practice.

6.0 OPERATION AND MAINTENANCE OF NEW DELIVERY POINT FACILITIES

Customer shall operate and maintain its Facility so as not to impact the reliability of the transmission system. TVA's System Operations Center provides routine training to customers regarding TVA's operating practices as outlined in Operating Letter No. 15 and Electrical System Operating Manual. Customer shall grant TVA access to TVA facilities (e.g., revenue meters, underfrequency relays, etc.) located in its Facility to allow operation and maintenance activities.

6.1 Synchronizing Facilities

If Customer's Facility involves a source of electric power by way of connection to generation or other transmission then synchronizing of TVA's Interconnection Facilities and the Customer's Facility shall be guided by "TVA's Facility Connection Requirements Document - Generation and Transmission."

6.2 Maintenance Requirements and Coordination

The Customer at a new delivery point should maintain its Facility in accordance with Good Utility Practice in a safe and reliable manner so as not to adversely impact the TVA transmission system. Special emphasis should be placed on Through Bus facilities as the performance of that equipment directly impacts the transmission system. TVA will be responsible for maintaining the transmission facilities connecting the Customer's facilities with the transmission system. Maintenance activities by either party may require an outage to the delivery point. Customer shall coordinate any needed outages as well as any maintenance issues with TVA's local Transmission Service Center.

6.3 Abnormal Frequency and Voltage Operation

During periods of abnormal frequency, load interruption may occur at delivery points where Customers participate in TVA's underfrequency (UF) and undervoltage (UV) load shed program. Resetting the lockout relay following a UF trip is not allowed until permission is received by TVA Transmission System Operator. Customers may install underfrequency or under-or over-voltage protection if needed to protect its Facility and loads supplied.

6.4 Communications and Responsibilities During Normal and Emergency Conditions

Customers should develop a working relationship with TVA's Transmission System Operators and the local Transmission Service Center in order to coordinate operating and maintenance needs. In case of failure of communication or in an emergency involving hazard to life or property, Customers should take the necessary prompt action. Reporting of such actions should be made to the Transmission System Operator as soon as possible.

7.0 SUPPORTING DOCUMENTATION

1. NERC Reliability Standard FAC-001 - Facility Interconnection Requirements (January 1, 2019)
2. NERC Reliability Standard TPL-001 - Transmission System Planning Performance Requirements (January 1, 2015)
3. SERC Facility Connection Requirements Guideline October 5, 2015
4. TOM-FTM-6-METR--003 REV 00002 - TVA Revenue Metering Guide for Customer Owned Substations
5. TRANS-SPP-06.012 R2, Metering Requirements for Generation, Physical Tie Lines, Pseudo-ties and Dynamic Schedules
6. TRANS-ENG-DES-09.520.2 - Electric Design Considerations
7. PSO-SPP-9.5.001 - Underfrequency Load Shedding
8. TVA's Facility Connection Requirements Document - Generation and Transmission
9. TRANS-SPP-18.005-Transmission Switching and Clearance Procedures.
10. Electrical System Operating Manual (current edition)
11. Transmission Service Guidelines

8.0 DEFINITIONS OF TERMS

1. Customer – the requestor of a new delivery point. In this document, it is assumed that the Customer will also be the owner and operator of the facilities to be connected to TVA's transmission system; however, in some cases this may not be so.

2. Facility – the Customer's facilities to be provided as its part in developing the new delivery point facilities for supplying load from the TVA transmission system.

3. TVA Interconnection Facilities – facilities provided and owned by TVA to provide a connection point for Customer's Facility from TVA's transmission system as part of developing a New Delivery Point for supplying load.

4. New Delivery Point Facilities – includes both TVA Interconnection Facilities and the Customer's Facilities.

5. Good Utility Practice - good, modern practices and procedures for generally accepted by the electric utility industry designing, operating, and maintaining utility facilities as noted in Terms and Conditions - New Delivery Points.

6. Delivery Point - where a Customer's load is connected to the transmission system. Typically, this is where the Customer-owned Facility connects to the TVA transmission system; however, lease or rental arrangements can extend the contractual point of delivery to a different location.

7. Scoping Workshop - A meeting to develop the technical scope of a capital project prior to design and construction. The workshop is a part of the scoping process that may include a site visit and other coordination before and after the scoping meeting between the parties involved.

8. Scoping Checklist - A standard list of items for discussion in a Scoping Workshop.

9. Through Bus - substation facilities related to the loop supply of a station where the power flow on the connected transmission system can flow across. Circuit breakers and switches are considered part of Through Bus.

10. TVA Act- enacted by the Senate and House of Representatives of the United States in 1933, the "Tennessee Valley Authority Act of 1933" [48 Stat. 58-59, 16 U.S.C. sec 831] created the federally owned corporation named "Tennessee Valley Authority."

New Delivery Point/Metering Point

Information for _____Substation

A new delivery/metering point for _____
(Power Distributor Name)

1. Location **Provide geographical reference(s) were the Substation will be located:**

_____

_____

2. Voltage **The high side of the Substation will be _____-kV. The low side will be _____-kV. If there is a third voltage, it will be ____-kV.**

3. High Side **High voltage equipment will consist of:**

_____

Protection

_____

4. Transformers **The customer plans to initially install_____ transformers.** **(insert number, voltage rating & MVA rating)**

In the foreseeable future the substation will have _____ transformers.

Is there anything unusual about these transformers? (Impedance, grounding, phasing, etc.)

_____

_____

5. Metering **The arrangement of the low side facilities will initially require _____sets of TVA metering instruments, transformers (PTs & CTs) , and meters.**

Years later, ____ sets of TVA metering instruments, transformers (PTs & CTs), and meters will be required.

Are there any other factors which may affect whether high side or low side metering is installed?

_____

_____

Will the customer desire metering pulses? Yes____ No____

Will a customer telephone circuit be available to transmit data from electronic meter? Yes____ No____

6. Loads **The initial load served by this substation will be _____MW and will be _____MW 10 years later.**

The initial load will be transferred from _____ Substation.

If the low side bus is split, the loads will be divided as follows:

_____

_____

____

7. Transmission Line Connections **Will customer or TVA construct the connection from TVA's line? _____. If a line trap is to be installed in customer's substation, is it agreeable for TVA to provide the trap and the customer to install it? _____ If TVA is to construct the tapline, what are the maximum design tensions, the pull-off heights, and the orientation of the customer's pull-off structures?**

_____

_

_____

8. Regulating Equipment **Regulators will be (include voltage, kVA rating & percent regulation):**

_____

_____

_____

Automatic Tap Changers (include voltage & percent steps):

_____

_____

Capacitor Banks (include voltage, number of banks & MVAR rating):

_____

_____

9. CT/ PT **Does the customer have a preference of CT or PT types (i.e. window type CTs)?**

_____

Does the customer want bar kits? Yes____ No____

10. Reactors **Voltage & Impedance for Phase Reactors:**

_____

_____

Neutral Reactors (which neutral, impedance):

_____

---

11. In-Service Date **The planned in-service date is _____.**
(date)
TVA's work in the substation needs to be completed by _____.
(date)

12. Drawings **The customer will provide TVA with appropriate drawings of the substation, including**
electrical single-line diagrams by _____.
(date)

13. Other Information **Provide any additional information that TVA may require in order to provide the necessary facilities in a timely manner:_____**

---

14. Contact Person **Provide name and telephone number of the customer's representative that may be contacted by TVA engineers:**

Name: _____

Phone:_____

Signatures **Distributor Representative:_____**

Date Signed:_____

TVA Project Engineer:_____

Date Signed:_____

TERMS AND CONDITIONS
(New Delivery Point)

SECTION 1 - COORDINATION

1.1 Objectives of Coordination. The parties agree that it is necessary to coordinate their efforts under this agreement to ensure that the following objectives are met: (a) timely and efficient completion of construction and connection of the New Substation to the TVA system, (b) timely and efficient completion of the metering installation, (c) the safe, reliable, and efficient operation of TVA's facilities, (d) prevention of any undue hazards to TVA's facilities and operations, and (e) the safety of the parties' personnel. Each party will use reasonable diligence in carrying out its responsibilities under this agreement and will notify the other of any significant changes in schedule.

1.2 New Substation Plans and Specifications. Distributor shall consult with TVA in designing the New Substation and shall use plans and specifications that TVA concurs will ensure consistency with objectives (c) and (d) in subsection 1.1 above. Distributor will design, construct, operate, and maintain the New Substation in accordance with good, modern practices and procedures.

1.3 New Substation Protective Scheme. Distributor shall also consult with TVA in planning for the installation, operation, testing, calibration, and maintenance of the protective scheme for the New Substation. Such protective scheme shall include backup protection for the New Substation in the event of failure of primary interrupting devices. As a minimum, backup protection would involve equipment (such as backup relays and fault initiating switches) to trigger operation of secondary interrupting devices (typically remote line breakers). Distributor agrees not to install, operate, or maintain any protective devices without TVA's concurrence that objectives (c) and (d) in subsection 1.1 above will be fully met.

1.4 TVA Review. Any review by TVA of Distributor's plans provided for in this agreement should not be considered an endorsement that they are adequate for Distributor's purposes. TVA will not unreasonably withhold its concurrence following any such review.

1.5 Metering. TVA and Distributor will coordinate their work under section 2 below to the extent necessary and practicable.

SECTION 2 - METERING

2.1 TVA's Installation Work. TVA at its expense shall provide and install the revenue meter and related items necessary to determine the power and energy taken by Distributor at the New Substation. This metering installation will be at a mutually satisfactory location in the New Substation.

2.2 Distributor's Installation Work.

2.2.1 Current and Voltage Transformers. Distributor shall, at its expense and in accordance with plans and specifications furnished or approved by TVA, install the metering current and voltage transformers (furnished by TVA). This will be done on the source side of any station service transformers and voltage correction equipment.

2.2.2 Miscellaneous Facilities. Distributor shall install all other facilities required for the metering installation, including a prewired meter cabinet (provided by TVA) and the foundation (if necessary) for TVA's meter cabinet, the primary connections from the metering transformers to Distributor's facilities and the conduit (together with any required test boxes) and cable extending from the metering transformer secondaries to the meter cabinet. Distributor will furnish the supplies and materials needed under this subsection 2.2.2, except that TVA will furnish the cable and test boxes.

2.3 Remote Access to Metering Installation.

2.3.1 Installation of Circuit. For TVA's metering purposes, including power quality monitoring, Distributor shall provide and install (or have installed) a telephone circuit (Circuit) and, if needed, protective conduit extending from TVA's revenue meter to a location specified by TVA. If TVA furnishes a telephone switcher, Distributor shall install it at an agreed upon location. Distributor installation of the Circuit and telephone switcher shall be in accordance with guidelines and specifications furnished or approved by TVA. Distributor shall install and then operate and maintain the Circuit (and any such conduit) at its expense. TVA will connect the Circuit to the revenue meter.

2.3.2 Distributor Access to Meter Data. TVA agrees to allow Distributor (a) remote access to TVA's metering data through the Circuit and (b) access to the metering information available from the readout display of the revenue meter. Use of the Circuit and access to the readout display will be coordinated between TVA's and Distributor's operating representatives to ensure unrestricted telephone access by TVA for data retrieval purposes during such periods as specified by TVA.

2.3.3 Remote Access Equipment. It is recognized that Distributor will need equipment not provided by TVA in order to obtain metering data by remote telephone access. If requested, TVA will assist Distributor in selecting such equipment, but acquisition of the equipment shall be the sole responsibility of Distributor.

2.4 Control of Metering Installation. Except as specifically provided otherwise in this agreement (or as agreed otherwise by TVA), the metering installation shall be for TVA's exclusive use and control. It may be used by TVA separately or in conjunction with any other metering facilities of TVA. TVA will place its seals on the revenue meter and metering facilities in the metering installation, and Distributor shall assure that those seals are not broken except at TVA's request.

2.5 Maintenance of Metering Installation.

2.5.1 TVA's Responsibilities. TVA at its expense shall test, calibrate, operate, maintain, and replace the portion of the metering installation provided and installed by TVA.

2.5.2 Distributor's Responsibilities. As requested by TVA from time to time, Distributor at its expense shall perform necessary maintenance (including making of replacements) of the remaining portion of the metering installation. In doing this work Distributor shall furnish the necessary materials, except that TVA shall furnish for installation by Distributor any replacements required for the current and voltage transformers, metering cable, and test boxes.

SECTION 3 - METERING OUTPUTS

3.1 Access to Outputs. Distributor may desire access to metering outputs from the metering installation for such purposes as monitoring and load control, and TVA is willing to make such access available at no charge. Accordingly, Distributor may, at such time as it deems appropriate, provide and install at its expense such additional facilities as are necessary for obtaining access to metering outputs. This includes provision and installation of cable to be connected by TVA to a terminal block in TVA's meter cabinet. Distributor shall also furnish and install any protective facilities requested by TVA for the protection of TVA's metering installation.

3.2 Approval of Facilities. Distributor shall keep TVA informed as to Distributor's plans for installation of any such additional facilities to the extent necessary and practicable. Distributor shall neither install any facilities which are to be connected to the metering installation nor, once installed, change them without prior written notification from TVA that such installation or change is satisfactory to TVA insofar as required for the safe and efficient operation of the metering installation.

3.3 Noninterference With Metering. In exercising access to metering outputs, Distributor shall not interfere with any operation, use of, or access to the metering installation by TVA. In this regard Distributor agrees to immediately modify its facilities and operations, in any manner requested by TVA, to avoid any such interference.

3.4 No Warranty of Outputs. TVA makes no statement, representation, claim, guarantee, assurance, or warranty of any kind whatsoever, including, but not limited to, representations or warranties, express or implied, (a) as to the accuracy or completeness of the metering outputs or as to such outputs' merchantability or fitness for any purposes for which Distributor uses or will use them or (b) as to quantity, kind, character, quality, capacity, design, performance, compliance with specifications, condition, size, description of any property, merchantability, or fitness for any use or purpose of any facilities through which the metering outputs are supplied. Distributor hereby waives, and releases the United States of America, TVA, and their agents and employees from, any and all claims, demands, or causes of action, including, without limitation, those for consequential damages, arising out of or in any way connected with Distributor's use of the metering outputs.

3.5 Termination of Arrangements. The arrangements set out under this section 3, may be terminated by TVA or Distributor at any time upon at least 120 days' written

notice. As soon as practicable following the effective date of such termination, TVA will disconnect the cable from the metering installation.

SECTION 4 - ADJUSTMENT OF METERED AMOUNTS

If the metering installation at the New Substation is not at the point of delivery specified in the Power Contract, the metered amounts of power and energy shall be appropriately adjusted to reflect losses (and non-metered station service or equipment use, if any) between the point of delivery and the metering installation. Distributor shall from time to time furnish TVA with the loss data for Distributor's facilities needed to allow TVA to make such adjustments.

SECTION 5 - RIGHTS OF ACCESS

Distributor hereby grants to TVA such rights to use Distributor's property as are reasonably necessary or desirable to enable TVA to carry out its responsibilities under this agreement. These rights include installation, operation, maintenance, replacement, removal, and inspection of TVA's electrical facilities and equipment (including metering equipment) installed in connection with service to Distributor.

SECTION 6 - POWER REQUIREMENTS

Distributor shall at its expense provide the battery and station service power requirements for TVA’s facilities and equipment (including metering equipment) installed at the New Substation.

SECTION 7 - TERM OF AGREEMENT

Except as otherwise provided, this agreement becomes effective as of the date of the agreement and continues in effect for the term of the Power Contract or any renewal, extension, or replacement of it.

SECTION 8 - RESTRICTION OF BENEFITS

No member of or delegate to Congress or Resident Commissioner, or any officer, employee, special Government employee, or agent of TVA shall be admitted to any share or part of this agreement or to any benefit that may arise from it unless the agreement be made with a corporation for its general benefit. Distributor shall not offer or give, directly or indirectly, to any officer, employee, special Government employee, or agent of TVA any gift, gratuity, favor, entertainment, loan, or any other thing of monetary value, except as provided in 5 C.F.R. part 2635 (as amended, supplemented, or replaced). Breach of this provision shall constitute a material breach of this agreement.

SECTION 9 - AMENDMENT

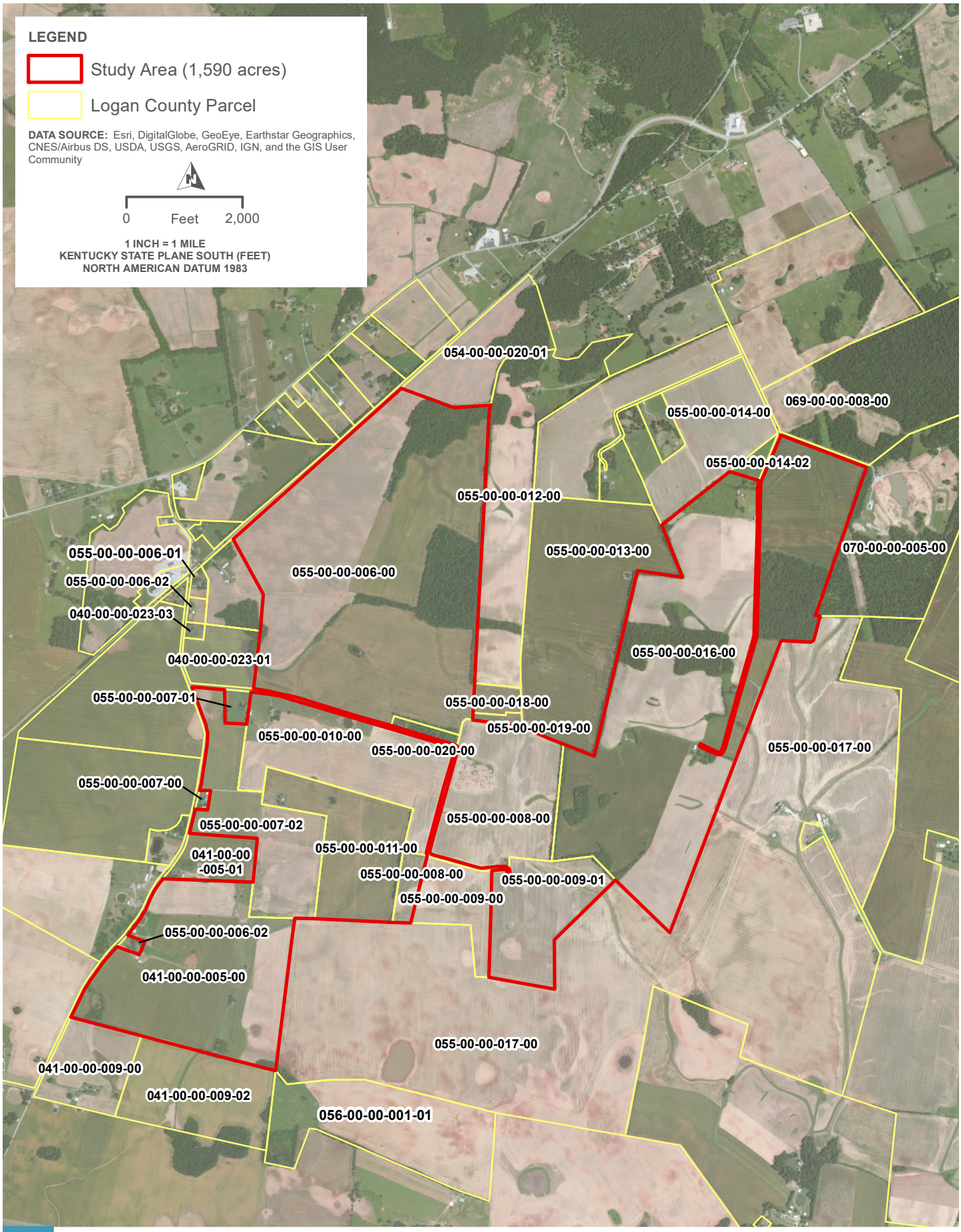
This agreement may be amended only by a writing signed by the parties.

W040706
power contract\delivery point\Delivery Point T&C

3. Refer to the Application, Attachment D, page 3. The table lists adjoining landowners. Submit a map showing parcel boundaries and the Russellville Solar boundaries. Label the adjoining parcels with the parcel number.

Response: The document attached below shows the labeled parcels and boundaries for the Russellville Solar boundaries as well the adjoining landowners included in Attachment D of the Application.

Witness: Stefan Eckmann



HDR SILICON RANCH

RUSSELLVILLE SOLAR
ADJACENT PARCELS

4. Refer to Russellville Solar's response to Siting Board Staff's First Request for Information (Staff's First Request), Item 29. An updated preliminary site layout was provided that indicated 12 access points. During the site visit, representatives of Russellville Solar indicated a smaller number of access points was anticipated. Provide the most current site layout map, including:

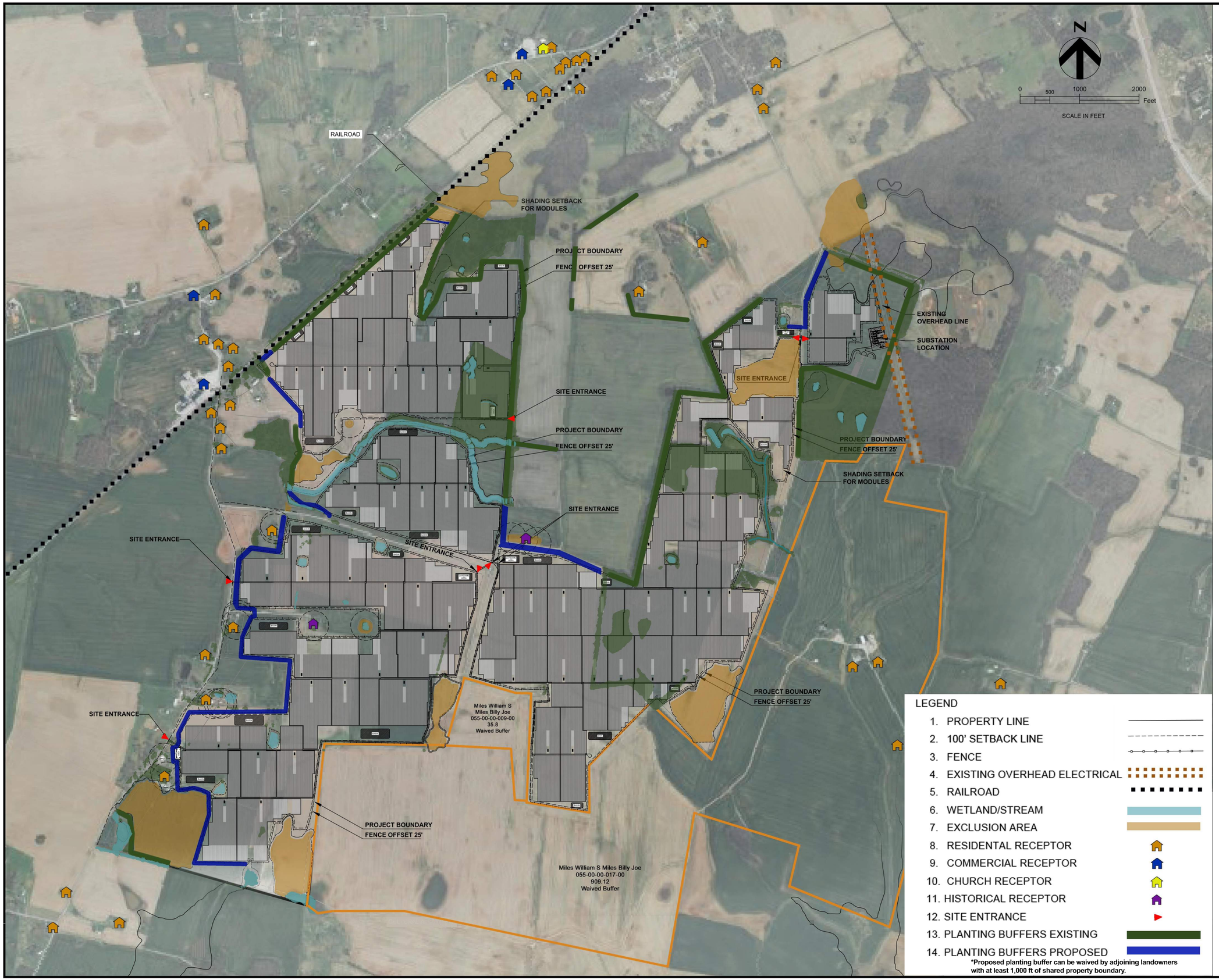
a. Location of all planned site entrances.

b. Roadways, including existing roadways and any road segments that will need to be constructed for site access.

c. Vegetative buffers, including those existing and planned.

Response: Attached below is the preliminary site layout, as updated with the most current site layout, site entrances, site roadways, and vegetative buffers. This revision also shows the two parcels for which the owners waived the vegetative buffers.

Witness: Harriet Richardson Seacat, HDR, and Stefan Eckmann



LEGEND

1. PROPERTY LINE
2. 100' SETBACK LINE
3. FENCE
4. EXISTING OVERHEAD ELECTRICAL
5. RAILROAD
6. WETLAND/STREAM
7. EXCLUSION AREA
8. RESIDENTAL RECEPTOR
9. COMMERCIAL RECEPTOR
10. CHURCH RECEPTOR
11. HISTORICAL RECEPTOR
12. SITE ENTRANCE
13. PLANTING BUFFERS EXISTING
14. PLANTING BUFFERS PROPOSED

*Proposed planting buffer can be waived by adjoining landowners with at least 1,000 ft of shared property boundary.

HDR

SILICON RANCH

NOT FOR CONSTRUCTION

LOGAN COUNTY SOLAR

RUSSELLVILLE, KY

LAT: 36.788944°N
LON: -86.947884°W

REV. NO	DESCRIPTION	DATE

SHEET TITLE:

PRELIMINARY SITE LAYOUT

PROJ. MGR.	PROJ. ENGR.	DATE:
HRS	MWB	04/26/2022
DRAWN BY:	CHECKED BY:	SCALE:
KH/ AM		1" = 700'

DRAWING NO.

L100

5. Logan County Ordinance 19-920-06 allows adjacent landowners to waive vegetative screening requirements. Provide any agreements with landowners pursuant to this ordinance. Identify these parcels on the map required in response to Item 4 above.

Response: Attached below are the two waivers we have received for parcel numbers 055-00-00-017-00 and 055-00-00-009-00, pursuant to the ordinance. These parcels have been identified on the map in response to Item 4. No additional vegetative buffer waivers will be requested.

Witness: Stefan Eckmann

Waiver of Landscape Buffer and Visual Screening

I, the undersigned, am the 100% fee owner of the property identified below (my "Property"). My Property directly adjoins the property leased by Russellville Solar LLC, a Delaware limited liability company ("Russellville Solar") on which Russellville Solar intends to construct a Solar Farm, as such term is defined in the Ordinance.

By signing below, I hereby waive all vegetative landscape buffer and visual screening requirements set forth in the Ordinance which might otherwise apply to the Solar Farm to be constructed by Russellville Solar.

This waiver shall be irrevocable, perpetual and shall run with the land. This waiver is given for the benefit of Russellville Solar, its affiliates, successors and assigns and any applicable local or state authorities, including, without limitation the Logan County Fiscal Court.

As used herein the "Ordinance" shall mean Ordinance No. 19-920-06 of the Logan County Fiscal Court titled "An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County", approved on August 27 2019, as the same may be amended from time to time.

Property Owner Name: Miles Farms, LLC

Property Address or Parcel Number: 055-00-00-009-00

Date: 4-19-2022

Signature: Debra Miles Seymour, Pres.

Waiver of Landscape Buffer and Visual Screening

I, the undersigned, am the 100% fee owner of the property identified below (my "Property"). My Property directly adjoins the property leased by Russellville Solar LLC, a Delaware limited liability company ("Russellville Solar") on which Russellville Solar intends to construct a Solar Farm, as such term is defined in the Ordinance.

By signing below, I hereby waive all vegetative landscape buffer and visual screening requirements set forth in the Ordinance which might otherwise apply to the Solar Farm to be constructed by Russellville Solar.

This waiver shall be irrevocable, perpetual and shall run with the land. This waiver is given for the benefit of Russellville Solar, its affiliates, successors and assigns and any applicable local or state authorities, including, without limitation the Logan County Fiscal Court.

As used herein the "Ordinance" shall mean Ordinance No. 19-920-06 of the Logan County Fiscal Court titled "An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County", approved on August 27 2019, as the same may be amended from time to time.

Property Owner Name: Miles Farms, LLC

Property Address or Parcel Number: 055-00-00-017-00

Date: 4-11-2022

Signature: Debra Miles Seymour, Mgr.

6. Provide any correspondence with the Logan County Road Department regarding the required widening and maintenance of AP Miller Road.

Response: Silicon Ranch has only had one in-person meeting with Kelly Wilson, Foreman of the Logan County Roads Department on April 26, 2022 and no further correspondence due to the status of project design. The in-person meeting was to discuss future use of both AP Miller Road and J. Montgomery Road for construction and operations of the proposed solar facility. Silicon Ranch asked about any requirements for construction and maintenance. Widening of AP Miller Rd. was not discussed as a requirement. The Logan County Road Department wants to ensure access is not blocked and others can continue to use AP Miller Rd. No existing maintenance requirements were provided. The latest project layout considers that others will use this roadway and does not block access. The project will be responsible for any maintenance as needed to keep the road operational not only for the construction of the solar plant but for the adjacent landowners as well. As the design advances and site logistics are being planned, improvements will be evaluated to keep safe maneuverability on AP Miller Road.

Witness: Stefan Eckmann

7. Provide the transportation plan for the project's substation transformer to the site, including any improvements necessary to Joe Montgomery Road or any other roads.

Response: The transportation plan for the main substation transformer will be managed by TVA but has not yet been developed. J. Montgomery Road will be formally assessed by both TVA and the project EPC contractor prior to construction to determine what improvements or temporary measures may be necessary for project and substation equipment delivery and construction, while providing the least disruption possible. A pre-construction video survey would be taken to document the conditions of the roads. If turning radii are not adequate for delivery of the substation transformer or other equipment, temporary measures will be used to facilitate maneuverability. This could include the use of curb blocks, mud mats, timber matting, tren-wa, etc. A survey of all overhead utilities will be completed as well to ensure proper vertical clearances are met. During construction, a construction manager/foreman would help set up the use of flaggers to negotiate any tight access points. A post-construction analysis would be completed to identify areas of the local roads that need to be remediated due to the solar project construction. Once procurement and delivery of the transformer is confirmed, Russellville Solar would work with local parties in the area, as well as the Logan County Road Department to plan for the least disruption possible.

Witness: Stefan Eckmann

8. Provide visual representations of the proposed project site, including any relevant overlays of the proposed facility equipment and vegetative screens. Specifically, include any before and after visualizations depicting the site with the solar arrays and vegetative screening.

Response: Visual representations of the project at different points along the project perimeter have been filed separately as "Attachment 8 Visual Renderings" including renderings of the solar project with and without vegetative buffer. A key for the rendering locations (key observation points; KOPs) is also provided. Note that some KOPs were not used to produce renderings; we have attached all that were produced for the project. Also note that the landowner at KOP No. 2 waived the vegetative buffer; thus, only an unbuffered view is shown.

Witness: Stefan Eckmann

9. Refer to the HDR Noise Memo provided in Russellville Solar's response to Staff's First Request, Item 5.

a. The noise receptors identified in Table 1 and Table 4 are not the receptors closest to the project boundary found in Figure 1 of the memo. Explain why receptors 1-5 on Figure 1 of the HDR Noise Memo are identified as the receptors that will experience the greatest construction noise instead of receptors 10-15 which are closer.

b. The memo states that tracking motor only operate for a few seconds at a time. Provide a description of the tracking motor operation, including how many seconds the motor engages at a time and how frequently per hour the motor engages.

Response:

a. The receptor numbering system used in the original submittal was different for operational noise and construction noise modeling. To address this, a new numbering system was created based on receptor distance from the property line, and all tables and figures in the Noise Memo were updated to reflect the latest numbering system. The revised memo is attached below.

b. The trackers will move approximately one-quarter inch every five minutes as the panels follow the sun. The tracker usually moves for approximately 15 seconds every five minutes during daylight hours. Based on this, hourly Leq at the receiver will be 12dBA lower than if the tracking motor operated continuously over the entire 60-minute period. The latest memo reflects this.

Witness: Harriet Richardson Seacat, HDR, and Stefan Eckmann

Memo

Date:	Tuesday, May 31, 2022
Project:	Logan County Solar
To:	Stefan Eckmann and P.J. Saliterman, Russellville Solar LLC
From:	Patrick Buffington, Sanvisna Kogelen, and Tim Casey, HDR Engineering, Inc.
Subject:	Kentucky Siting Board RFI 1 and 2 – Noise Response

Introduction

This memorandum summarizes responses to the requests for information (RFIs) from the Kentucky State Board on Electric Generation and Transmission Siting (state siting board) pertaining to the solar photovoltaic facility known as Logan County Solar (Project), proposed to be located approximately two miles southwest of the city of Russellville in Logan County, Kentucky (Project site).

Question Numbers (Nos.) 5 and 7 through 11 in RFI 1 are related to the noise study conducted by HDR; responses to each question are outlined in the following sections. This memo also reflects changes based on Question Number 9 in RFI 2.

Question No. 5

SET FORTH THE DISTANCE FROM RECEPTORS TO THE NEAREST PANEL TRACKING MOTORS AND THE ANTICIPATED DBA OF TRACKING MOTOR NOISE AT THE RESIDENTIAL RECEPTORS NEAREST TO THE PROJECT, ASSUMING 78 DECIBELS AT 50 FEET, AS DESCRIBED IN SECTION 2.3.1 OF THE NOISE ASSESSMENT.

Tracking motors are partially hidden by the solar panels themselves, which also blocks some of the noise they create. HDR propagated noise from a tracking motor to the five nearest homes. This calculation assumed a single tracking motor with a reference sound pressure level of 78 A-weighted decibels (dBA) at 50 feet. HDR assumed that all tracking motors would be located within the facility fence line; therefore, HDR modeled the tracking motor to be located at the fence line to represent the closest locations to receptors at which a tracking motor may be placed. HDR also took into account that the motors are not a continuous source of noise. Instead, the tracking motors would move approximately one-quarter inch over 15 seconds every five minutes as the solar panels track the sun (three minutes in an hour). Based on this, the daytime hourly Leq (i.e., average noise level during the noise measurement) at the receptor will be 12 dBA lower than if the tracking motor operated continuously for 60 minutes over an hour-long period. The calculation ignores the acoustical shielding provided by the solar panels and also the excess absorption provided by

acoustically soft (absorptive) ground cover (grass, etc.). This results in conservatively high estimates of noise from a tracking motor. Table 1 presents these results.

Table 1. Estimated Daytime Tracking Motor Noise Levels

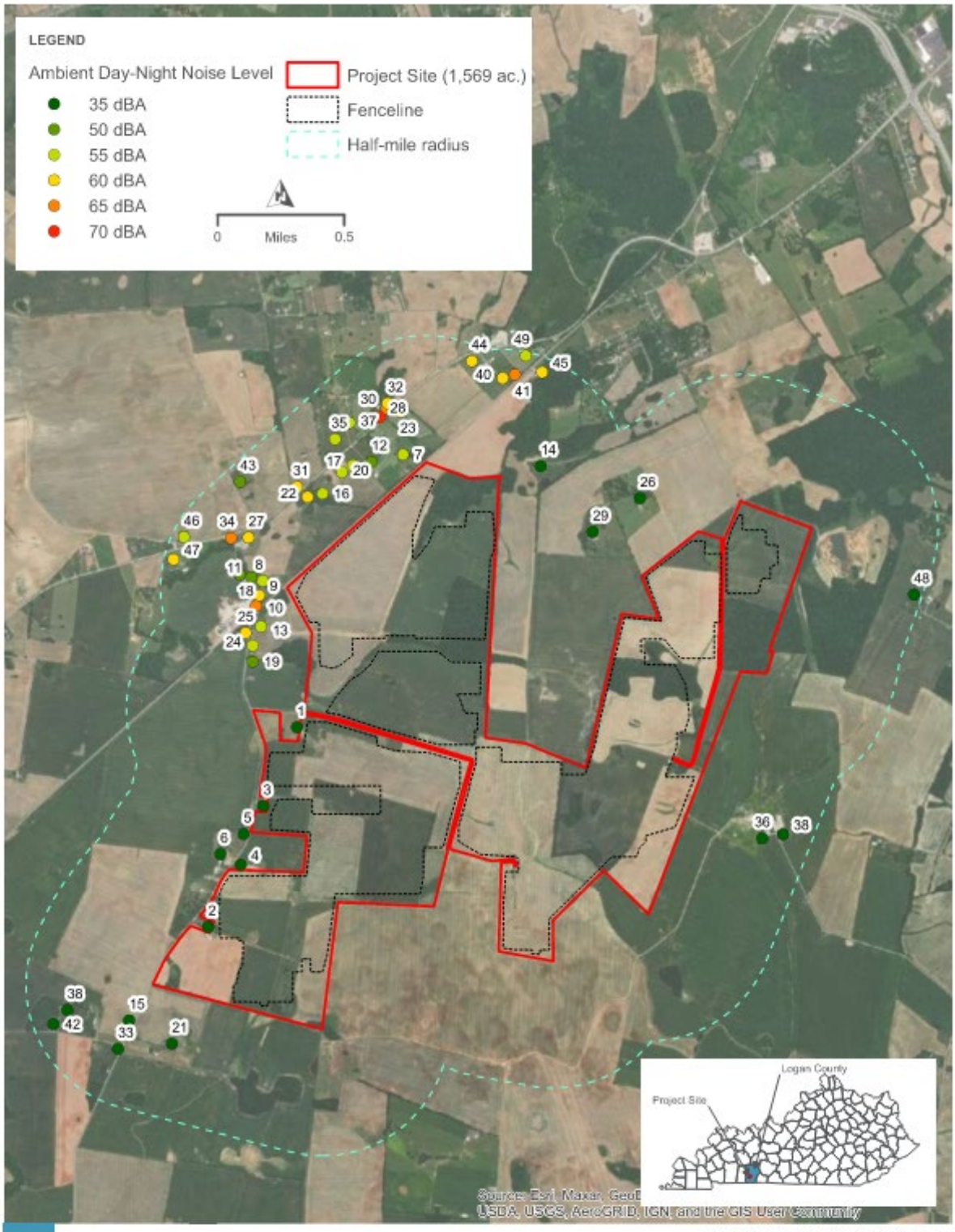
Receptor	Distance from property line (ft)	Distance from fence line (ft)*	Modeled Daytime Hourly Leq (dBA)
1	58	194	57
3	67	218	56
4	112	236	56
2	66	239	56
6	369	493	51

Source: HDR 2022
*Receptors are listed in order of proximity to the fence line

Question No. 7

QUESTION NO. 7A. OF THE APPROXIMATELY 113 NOISE RECEPTORS WITHIN A HALF-MILE RADIUS OF THE PROJECT SITE, STATE HOW MANY ARE PARTICIPATING IN THE PROJECT.

The original application stated that there were 113 noise-sensitive receptors within 0.5 mile of the Project, consisting of residences, residential farm complexes, associated outbuildings, and nonresidential agricultural complexes. In re-evaluating the receptors per the state siting board RFIs, the Project team determined that “noise-sensitive” refers to land uses where quiet-time is necessary to the function of the land use, such as residences, churches, schools, and hospitals. Areas where people work, such as offices, barns, or garages, are not considered noise-sensitive in environmental noise analyses. Therefore, HDR adjusted the number and location of noise-sensitive receptors per this standard definition to include the 49 residences surrounding the Project site. The locations of these residences are scattered throughout the 0.5 mile surrounding the Project site. Receptors exist near State Highway 79 and the R. J. Corman Railroad Group, LLC railroad corridor and in the more agricultural portions of Project vicinity. All 49 of the receptors are non-participating in the Project. Figure 1 shows location of the 49 receptors, as identified by their Receptor Identification Number (Receptor ID).



LOGAN COUNTY SOLAR

NOISE RECEPTOR MAP

FIGURE 1

QUESTION NO. 7B. GIVEN THE TYPICAL EXISTING NOISE LEVELS, PROVIDE AN ESTIMATE OF THE AMBIENT NOISE LEVELS AT EACH OF THE NOISE RECEPTORS.

HDR estimated ambient outdoor noise levels at each of the 49 noise-sensitive receptor locations using methods developed by the U.S. Environmental Protection Agency (USEPA) and published in Table 5-7 "Estimating Existing Noise Exposure for General Assessment" from the Federal Transit Administration's (FTA) *Transit Noise and Vibration Assessment* manual, May 2006 edition (FTA 2006). This methodology uses proximity to major roads and railroads, and population density to estimate ambient day-night noise levels (L_{dn}). Each receptor was evaluated based on its distance from State Highway 79 and the railroad. Slower, two-lane roads in the Project vicinity were not considered under this methodology. HDR identified population density using 2020 Census data from the U.S. Census Bureau. All receptors are located within Census Tract 9605 in Logan County, where the population was determined to be 75 people per square mile (USCB 2020).

Using this approach, HDR assigned three L_{dn} values to each receptor: one for its proximity to the highway, one for its proximity to the railroad, and one based on the population density based on the FTA methods. For receptors located more than 1,000 feet from both the highway and the railroad, only the L_{dn} value based on population density was considered. Per the USEPA/FTA method, the highest of the three estimated ambient day-night noise level for each receptor was considered to be the existing L_{dn} and shown in Table 2 and Figure 1.

Table 2. Ambient Day-Night Noise Levels at Noise-Sensitive Receptors

Receptor ID	Distance from Road (feet)	Distance from Rail (feet)	Population Density (people/mi^2)	Day-Night Noise Level (Ldn) in A-weighted Decibels (dBA)			
				Noise Level Based on Road Distance (dBA)	Noise Level Based on Rail Distance (dBA)	Noise Level Based on Population Density (dBA)	Maximum Resulting Noise Level (dBA)
1	NA	NA	75	NA	NA	35	35
2	NA	NA	75	NA	NA	35	35
3	NA	NA	75	NA	NA	35	35
4	NA	NA	75	NA	NA	35	35
5	NA	NA	75	NA	NA	35	35
6	NA	NA	75	NA	NA	35	35
7	400+	240-500	75	50	55	35	55

Receptor ID	Distance from Road (feet)	Distance from Rail (feet)	Population Density (people/mi^2)	Day-Night Noise Level (Ldn) in A-weighted Decibels (dBA)			
				Noise Level Based on Road Distance (dBA)	Noise Level Based on Rail Distance (dBA)	Noise Level Based on Population Density (dBA)	Maximum Resulting Noise Level (dBA)
8	NA	240-500	75	NA	55	35	55
9	NA	120-240	75	NA	60	35	60
10	NA	60-120	75	NA	65	35	65
11	400+	500-800	75	50	50	35	50
12	400+	500-800	75	50	50	35	50
13	NA	240-500	75	NA	55	35	55
14	NA	NA	75	NA	NA	35	35
15	NA	NA	75	NA	NA	35	35
16	200-400	800+	75	55	45	35	55
17	200-400	800+	75	55	45	35	55
18	400+	500-800	75	50	50	35	50
19	NA	500-800	75	NA	50	35	50
20	200-400	800+	75	55	45	35	55
21	NA	NA	75	NA	NA	35	35
22	100-200	NA	75	60	NA	35	60
23	100-200	NA	75	60	NA	35	60
24	NA	240-500	75	NA	55	35	55
25	NA	120-240	75	NA	60	35	60
26	NA	NA	75	NA	NA	35	35
27	100-200	NA	75	60	NA	35	60
28	10-50	NA	75	70	NA	35	70
29	NA	NA	75	NA	NA	35	35
30	50-100	NA	75	65	NA	35	65
31	100-200	NA	75	60	NA	35	60

Receptor ID	Distance from Road (feet)	Distance from Rail (feet)	Population Density (people/mi^2)	Day-Night Noise Level (Ldn) in A-weighted Decibels (dBA)			
				Noise Level Based on Road Distance (dBA)	Noise Level Based on Rail Distance (dBA)	Noise Level Based on Population Density (dBA)	Maximum Resulting Noise Level (dBA)
32	100-200	NA	75	60	NA	35	60
33	NA	NA	75	NA	NA	35	35
34	50-100	NA	75	65	NA	35	65
35	200-400	NA	75	55	NA	35	55
36	NA	NA	75	NA	NA	35	35
37	200-400	NA	75	55	NA	35	55
38	NA	NA	75	NA	NA	35	35
38	NA	NA	75	NA	NA	35	35
40	400+	120-240	75	50	60	35	60
41	400+	60-120	75	50	65	35	65
42	NA	NA	75	NA	NA	35	35
43	400+	NA	75	50	NA	35	50
44	100-200	800+	75	60	45	35	60
45	400+	120-240	75	50	60	35	60
46	200-400	NA	75	55	NA	35	55
47	100-200	NA	75	60	NA	35	60
48	NA	NA	75	NA	NA	35	35
49	200-400	240-500	75	55	55	35	55

Source: HDR 2022
NA = Not applicable

QUESTION NO. 7C. GIVEN THE TYPICAL NOISE LEVELS, EXPLAIN HOW IT IS DETERMINED THAT THE ADDITIONAL NOISE FROM CONSTRUCTION ACTIVITY IS DEEMED TO BE A NUISANCE AND, THUS, IN NEED OF MITIGATION.

HDR reviewed local, county, and state ordinances for any noise limitations applicable to the Project. No quantitative noise limits were found at any level of government during the review. The City of Russellville only has noise ordinances in place in relation to pets, vehicle noise, and truck engine braking, none of which are applicable to the Project. Logan County does not have ordinances publicly available; therefore, county noise limits were not evaluated. The State of Kentucky repealed most of its noise control statutes in 2017, and now delegates the development of noise regulation programs to local governments (2021 Kentucky Revised Statutes, Chapter 278.30-175).

The Kentucky Public Service Commission regulates electricity generation and requires facilities to apply for a certificate to construct a merchant generating facility. As a part of this application, a facility is required to include a statement certifying that the proposed plant will be in compliance with all local ordinances and regulations concerning noise control (2021 Kentucky Revised Statutes, Chapter 278.706). As described above, no noise regulations applicable to the Project exist; however, estimates of Project-related construction and operational noise have been provided as a response to the RFIs.

When pile driving occurs on a construction project, it is usually the loudest construction-related activity. Impact and impulsive noise sources are potentially more annoying than constant, non-fluctuating noises because they stand out from the background noise environment more distinctly than constant noise sources. HDR understands that pile driving will be used on this Project, and therefore, evaluated pile driving noise as discussed in a response below.

Question No. 8

REFER TO THE SAR EXHIBIT E, PAGES 3-4 AND APPENDIX, FIGURE 4. PROVIDE AN UPDATED FIGURE 4 AND A LIST OF NON-PARTICIPATING NOISE RECEPTORS WITHIN THE HALF-MILE RADIUS OF THE PROJECT PROPERTY BOUNDARY.

As discussed in the response to Question No. 7a, Figure 1 shows the locations of the 49 noise-sensitive receptors, all of which are assumed to be non-participating.

IN THE UPDATE, SET FORTH THE DISTANCE FROM EACH NOISE RECEPTOR TO THE PROPERTY BOUNDARY.

Due to the number of receptors, it is not feasible to show the distances on the figure; instead, Table 3 shows the distance from each noise-sensitive receptor to the property boundary.

Table 3. Receptor Proximity to Project Property Boundary

Receptor ID	Distance from Property Line (feet)
1	58
2	66
3	67
4	112
5	146
6	369
7	441
8	522
9	601
10	745
11	768
12	771
13	864
14	864
15	886
16	959
17	976
18	1,013
19	1,017
20	1,023
21	1,086
22	1,112
23	1,190
24	1,204
25	1,205
26	1,295
27	1,311

Receptor ID	Distance from Property Line (feet)
28	1,349
29	1,376
30	1,396
31	1,419
32	1,468
33	1,516
34	1,557
35	1,627
36	1,657
37	1,683
38	1,859
38	2,033
40	2,045
41	2,140
42	2,223
43	2,288
44	2,312
45	2,336
46	2,399
47	2,439
48	2,475
49	2,568

Source: HDR Engineering, Inc. 2022

[SET FORTH THE] MAXIMUM ANTICIPATED NOISE LEVEL AT THE PROPERTY BOUNDARY,
Impact pile driving is expected to be the loudest activity on-site during construction and operation of the proposed facility. There are numerous estimates of pile driving noise in publicly available literature. For this analysis HDR used impact pile driving noise levels published by FHWA/FTA. Quieter technologies exist.

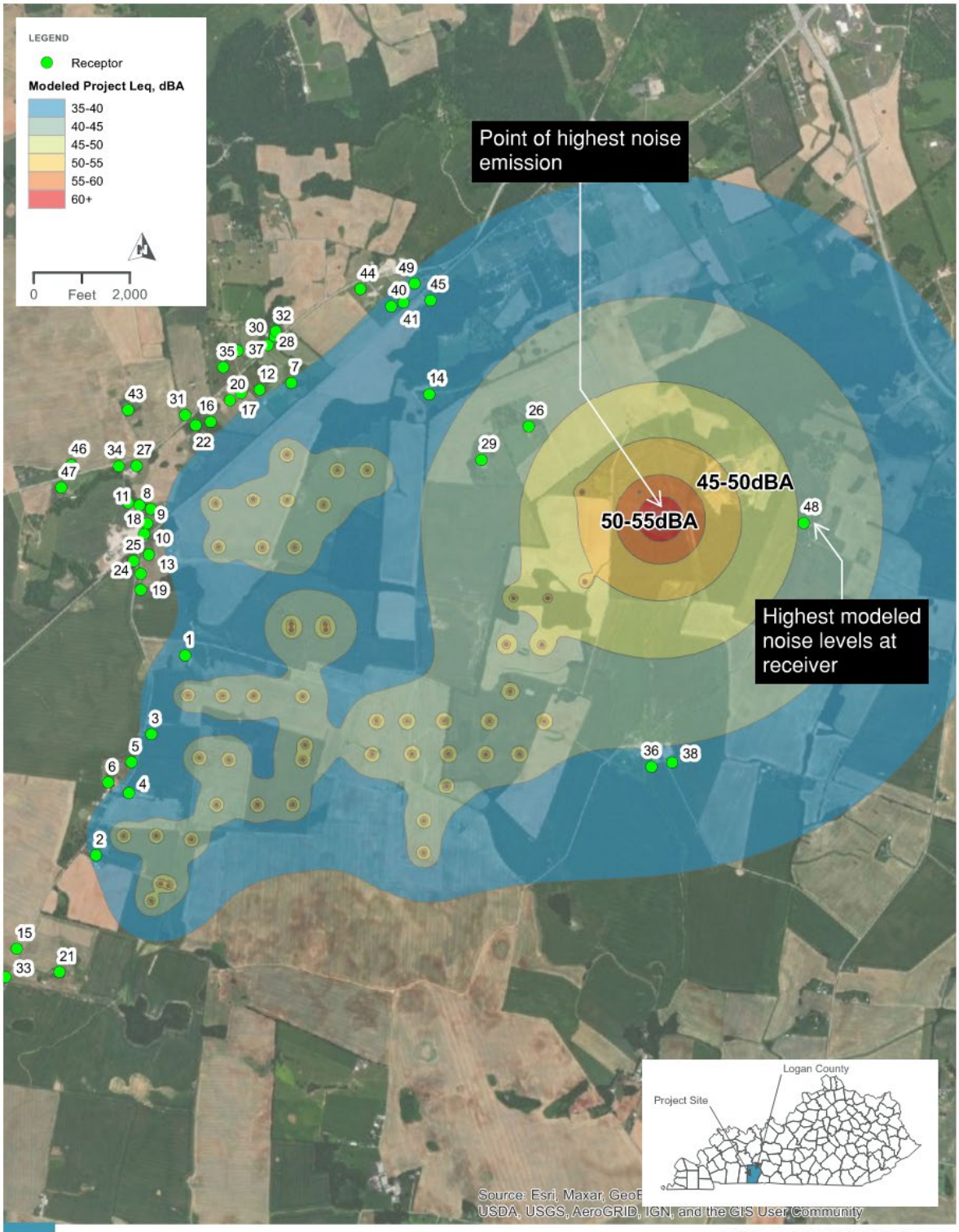
Up to 10 pile drivers may be used simultaneously during construction and if they are all traditional impact pile drivers the maximum noise levels at the property boundaries may range from approximately 95 dBA to 102 dBA. The following responses provide more detail regarding noise emissions from construction and operation of the Project.

[SET FORTH THE] SOLAR PANEL PLATFORM PILE DRIVING SOUND LEVELS AT PROPERTY BOUNDARIES,

During construction up to 10 impact pile drivers may operate simultaneously. To determine the upper range of potential pile driving noise levels, HDR conservatively assumed all 10 impact pile drivers were located side-by-side and set back a minimum of 100 feet from the property boundary. Using this conservative approach, modeling results indicate the pile driving noise levels are expected to reach a maximum of 102 dBA at the property boundary.

[SHOW THE] MAXIMUM ANTICIPATED NOISE LEVEL AT THE NOISE RECEPTOR, AND THE POINT OF THE MAXIMUM NOISE GENERATION.

To evaluate noise from Project operations, HDR used Cadna-A 3-dimensional noise modeling software that incorporates the international acoustical standard for sound propagation outdoors. HDR modeled daytime noise emissions from the proposed inverter pads located where they are currently proposed. HDR also modeled daytime noise emissions from the proposed battery energy storage system and the transformer at the proposed substation. Cadna-A calculated overall Project-related daytime noise levels from these sources at each intersection on a Cartesian coordinate grid and then created daytime noise contour lines as shown in Figure 2 below. HDR also configured Cadna-A to calculate daytime noise levels at each receptor. By inspection, the loudest noise source during daytime operations is the substation transformer. Solar PV facilities do not make noise at night when sunshine is unavailable to produce electricity. Noise contours in Figure 2 show the anticipated Project-related daytime noise level at each residence, including the receptor anticipated to receive the highest levels of noise from Project operations (Receptor ID 48, 44 dBA).



LOGAN COUNTY SOLAR

OVERALL DAYTIME NOISE CONTOURS

FIGURE 2

PATH: Y:\RUSSELLVILLE\7.2_WIP\MAP_DOCS\FIGURES\RUSSELLVILLE_NOISE-CONTOURS_20220531.MXD - USER: SKOGELEN - DATE: 5/31/2022

PROVIDE A CONTOUR MAP RELATED TO FIGURE 4 WITH DBA SOUND LEVEL CONTOURS AROUND NOISE GENERATING AREAS.

Refer to Figure 2.

Question No. 9

PROVIDE A TABLE OR GRAPHIC CONTAINING THE DISTANCE AND ANTICIPATED SOUND PRESSURE LEVEL DBA DURING THE CONSTRUCTION PHASE AT EACH NON-PARTICIPATING RESIDENCE WITHIN 500 FEET OF PILE DRIVING ACTIVITIES.

There are five noise-sensitive receptors within 500 feet of pile driving activities. Table 4 shows the Receptor ID for homes located within 500 feet of the property line, the distance to the property line and fence line, and a conservatively high estimate of pile driving noise at the receptor based on the assumption of 10 pile drivers operating simultaneously side-by-side.

Table 4. Modeled Construction Noise Levels and Distance from Property Line

Receptor*	Distance from property line (ft)	Distance from fence line (ft)	Modeled Leq (dBA)
1	58	194	96
3	67	218	95
4	112	236	94
2	66	239	94
6	369	493	87

Source: HDR 2022

Question No. 10

PROVIDE A TABLE OR GRAPHIC LISTING THE CLOSEST NON-PARTICIPATING RESIDENCES TO THE SUBSTATION. INCLUDE IN THE TABLE THE DISTANCE BETWEEN THE RESIDENCE AND THE SUBSTATION AND THE ANTICIPATED SOUND PRESSURE LEVEL DBA AT THE RESIDENCE.

Table 5 shows the distance from the five receptors closest to the substation, and the modeled daytime Project-related noise level.

Table 5. Modeled Operational Noise Levels and Distance from Substation

Receptor*	Distance (ft)	Modeled Leq (dBA)
48	3,008	44
26	3,306	44
29	3,900	42
38	5,103	40
36	5,181	40

Source: HDR 2022
*Receptors are listed in order of proximity to substation

Question No. 11

PROVIDE ANY STUDIES OR GUIDELINES THAT RUSSELLVILLE SOLAR RELIED ON TO DETERMINE THAT NOISE LEVELS FROM THE CONSTRUCTION AND OPERATION OF THE SOLAR FACILITY ARE INSIGNIFICANT CONTRIBUTORS TO THE OPERATIONAL SOUND LEVELS OF THE SITE.

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Assessment*, May 2006 edition.

Marr, W. Allen, P.E. 2015. "Addressing and Alleviating Negative Public Perceptions of Pile Driving". *Pile Driver,* Quarter 3, 2015. Accessed 22 April 2022. http://www.pilingcanada.ca/tagged/q4-2015/dealing-with-vibration-and-noise-from-pile driving

Office of Planning and Environment, Federal Transit Administration. 2006. *Transit Noise and Vibration Assessment*. (May)

Teachout, Emily and Cushman, Tom. 2005. "Use of a Pile Driver Shroud to Minimize Disturbance to Wildlife" Presented at Transportation Research Board Noise and Vibration Conference, Seattle, Washington. Accessed 22 April 2022. http://www.adc40.org/presentations/summer2005/26_Teachout_noiseshroud.pdf

U.S. Census Bureau (USCB). 2020. *2020 Census Demographic Data Map Viewer.* Accessed 21 April 2022. https://mtgis-portal.geo.census.gov/arcgis/apps/MapSeries/index.html?appid=2566121a73de463995ed2b2fd7ff6eb7

10. Describe any mitigation measures for tracking motor noise.

Response: The noise emanating from the tracker will be negligible. The tracker motors produce too few decibels to be heard unless standing inside the surrounding arrays. To further safeguard noise levels along the perimeter of the facility the Project has incorporated a planting buffer at various points around the perimeter of the facility and will locate motors as far from residential neighborhood homes to the greatest extent practical.

Witness: Stefan Eckmann

11. Provide any written or verbal concerns Russellville Solar has received about the proposed tracking motor noise levels and frequency.

Response: Aside from those general questions and concerns on noise submitted to the Siting Board via requests for information, Russellville Solar does not recall having received specific concerns about the proposed tracking motor noise levels and frequency.

Witness: Stefan Eckmann

12. Refer to the Application, Attachment G, Economic Impact Report page 2 and the Site Assessment Report (SAR) Exhibit E, Section 3.2. Both documents reference 450 construction workers during peak construction. Also, refer to Russellville Solar's response to Staff's First Request, Item 30(c). The response indicates 250 construction workers during peak construction. Provide the correct number of construction workers during peak construction.

Response: The correct number of expected construction workers during peak construction is 350. The previous number of 250 provided by the proposed EPC (engineering, procurement, and construction) contractor in Russellville Solar's First RFI response was a mistake. 450 was the estimated peak number of workers before discussions were held with the EPC contractor.

Witness: Stefan Eckmann

13. Refer to the SAR Exhibit E, Section 3.2. Provide any incentives or measures that will be used to encourage ridesharing for the construction phase of the project.

Response:

To encourage ridesharing for the construction phase of the project, carpooling will be strongly recommended and encouraged as part of the construction site orientation held by the EPC contractor. Once on-site, bussing will be available to shuttle workers to their areas of operation. Staff will be provided with very reasonable per diems so that they can use local accommodations close to site, thus reducing commutes and emissions. Those workers staying in common establishments will likely carpool to and from the job site.

Witness: Stefan Eckmann

COMMONWEALTH OF KENTUCKY
BEFORE THE KENTUCKY STATE BOARD
ON ELECTRIC GENERATION AND TRANSMISSION SITING

In the Matter of:	)	
	)	
APPLICATION OF RUSSELLVILLE SOLAR LLC	)	
FOR CERTIFICATE OF CONSTRUCTION FOR: AN	)	
APPROXIMATELY 173-MEGAWATT MERCHANT	)	**Case No. 2021-00235**
ELECTRIC SOLAR GENERATING FACILITY IN	)	
LOGAN COUNTY, KENTUCKY PURSUANT TO	)	
KRS 278.700, ET SEQ., AND 807 KAR 5:110	)	

CERTIFICATION

This is to certify that I have supervised the preparation of Russellville Solar LLC's responses to the Siting Board Staff's Second Request for Information and that the responses are true and accurate to the best of my knowledge, information, and belief after reasonable inquiry.

Date: 5/31/2022

Stefan Eckmann