September 23, 2024

Solar Generation Siting Final Report – Weirs Creek Solar

KY State Board on Electric Generation and Transmission Siting
Case # 2024-00099

Customer:
Kentucky Public Service Commission

Prepared for:
KY State Board on Electric Generation and Transmission Siting

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September 23, 2024

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Solar Generation Siting Final Report – Weirs Creek Solar

Synopsis

This document is the Final Report prepared by Elliot Engineering for the Weirs Creek Solar Electric Solar Generating facility in Webster/Hopkins County, KY.

WEPSC Order: WE240610179

Public Service Commission PO:
PON2 123 2400002405

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REVISIONS

Revision	Date Issued	Issue Type	By	Description
0	9-23-24	Final Report	CA	Issue for Review & Record

Power Systems Engineering

Since 2004, Wells Engineering has served utility, industrial, and commercial facilities for all their power needs. Quality and innovation have established Wells as the go-to engineering firm specializing in the planning, design, control, and analysis of electrical power systems. With a great reputation of working closely with our clients and listening to their requests, our team diligently provides solutions that fit every need.

Wells Engineering delivers innovative solutions aligned with rigid standards and best engineering practices.

Our Mission

Our mission is to provide unsurpassed quality engineering service and customer support. We will conduct our business in the most professional manner possible and provide the highest quality product in a timely manner. Our value-added engineering will be recognized and provide the opportunity to earn our customers' confidence. We will use proven technology to create advanced power systems designs to support the development of the safest and most reliable systems for our clients.

Services

PLANNING AND STUDIES. Arc Flash Hazard Analysis • Short Circuit Analysis • Equipment Evaluation Analysis • Coordination Analysis • Load Flow Analysis • Power Factor Correction • Harmonic Analysis • Cable Ampacity Analysis • Motor Starting Analysis • Power Quality Analysis • Voltage Flicker Analysis • Insulation Coordination Analysis • Switching Transient Analysis • Generator Stability Analysis • Ground Mat Analysis • Grounding and Bonding Study • DC Power System Analysis • Project Feasibility Studies

DESIGN ENGINEERING AND EPC SERVICES. Generator Protection & Control • T&D Line • Power Substation • Transmission Switching Stations • Gas Insulated Substations • SCADA • Capacitor & Harmonic Filter Banks • Motor Protection & Control • Protection Relaying Schemes • Underground Duct banks • Unit Substations • LV/MV Motor Control Centers • AC/DC Traction Power Substations • LV/MV Power Cable Distribution • Emergency Generator Integration • ATS Specifications & Design

APPLICATION ENGINEERING. Relay Protection & Control • RTU & RTAC Programming • Induction Motor Control • Synchronous Motor Control • Capacitor & Filter Banks • SVC Systems • FACTS/STATCOM • Forensic Investigation • Sequence of Events Failure Analysis • Power Systems Planning • Grounding & Bonding • Maintenance Planning & Audits • Troubleshooting • Disaster Recovery Plans • Technical Witness.

PROJECT AND CONSTRUCTION MANAGEMENT. Equipment Specifications • Bid Document Facilitation • Subcontractor Qualification • Vendor Selection • Construction Estimates • Contract Administration & Implementation • OEM Factory Witness Testing • Resource Management • Master Project Schedule • Material Tracking • Spare Parts Management • Warranty Negotiation • Procurement Leveraging • Cash Flow Management

TESTING AND COMMISSIONING. MV/HV/EHV Circuit Breakers • Circuit Switchers • MV Switchgear • GSU & Power Transformers • Capacitor Banks • Harmonic Filter Banks • PTs & CCVTs • CTs • Substation Relay Protection & Control • Overcurrent, Fault Locators, & Distance Relays • Generator Protection Relaying Disconnect Switches • Surge Arrestors • Station Batteries • Grounding Resistors/Reactors/Transformers • Ground Grid • Reclosers • Reactors • Thermography • Relay protection & controls • Substation Commissioning • Predictive & Preventative Maintenance • Field Engineering & Troubleshooting • Arc Flash Hazard Analysis & Training • Refurbishment & Repair Electrical System Upgrades • NERC Compliance Testing

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1 General Statement

The present document is the Final report prepared for the Solar Generation siting project of Weirs Creek Solar who is applying for a certificate of construction for an approximately 150-megawatt Merchant Electric Solar Generation Facility in Webster and Hopkins County, KY.

1.1 Scope

As part of the personal service contract for the 'Generation Siting Board 2024', between The Commonwealth of Kentucky Energy Environment Cabinet/Public Service commission and Elliot Engineering, in the matter of the order issued for case number 2024-00099, Elliot Engineering was appointed to review the Application documents and the Site assessment report submitted by the applicant as per the Kentucky Revised Statutes 278.706, 278.708 and submit a Final report on the Solar Generation Siting for the application for a construction certificate by Weirs Creek Solar in Webster and Hopkins County, KY.

Elliot Engineering contracted the following expertise based on the requirements of the project,

i) Clover lake Consulting Services for Noise & Environmental assessment
ii) Watters Unclaimed Property Consulting LLC for Economic impact.
iii) Clark Toleman, MAI,SRA for the review on impact on property values

1.2 Reference Document

The following documents are referenced for the creation of this document.

i. 20240411_Weirs Creek Solar, LLC Notice of Intent and Election
ii. 20240411_PSC Acknowledgment Letter
iii. FINAL_Notice_of_Intent
iv. Read_First_Notice_of_Intent
v. Respons_to_NOI_Deficiency
vi. 20240418_PSC Deficiency Cured Letter-Notice of Intent
vii. 20240506_Letter Filing Letter to Judge Executive Jack Whitfield into the Record
viii. 20240517_ Letter Filing Letter to Governor Requesting Ad Hoc Appointment
ix. 20240604_Weirs Creek Solar, LLC Notice of Payment for Application Fee
x. 20240606_Acknowledgement Letter of Application Fees
xi. Weirs_Creek_Application_-_FINAL
xii. Read_First_Weirs_Creek_App
xiii. Application,_Exhibits_13-16
xiv. Application,_Exhibits_1-11
xv. Application,_Exhibit_12_SAR,_Exhibits_1-6

xvi. Application,_Exhibit_12_SAR,_Exhibit_8
xvii. Application,_Exhibit_12_SAR,_Exhibit_7_Part_1
xviii. Application,_Exhibit_12_SAR,_Exhibit_7_Part_2
xix. Application,_Exhibit_12_SAR,_Exhibit_7_Part_3
xx. 20240607_No Deficiency Letter
xxi. 20240611_Letter Filling Letter Notifying Hopkins County Judge Executive Jack Whitfield, Jr. as Ad Hoc Rep.
xxii. 20240621_PSC_ORDER
xxiii. 20240722_DATA_REQUEST
xxiv. 20240802_Letter Filling Executive Order 2024-520 into the Record
xxv. Weirs_Creek_Confidential_DR1
xxvi. Responses_to_DR_1_FINAL
xxvii. Response_1-38_Leases_REDACTED
xxviii. Response_1-32_Geotechnical_Report
xxix. Response_1-3_Structure_Distance
xxx. Read_First_DR1
xxxi. 20240826_DATA_REQUEST
xxxii. Response_to_DR_2
xxxiii. Read_First_DR2
xxxiv. Attachment_2-17(a)
xxxv. Attachment_2-17(b)
xxxvi. Attachment_2-17(c)
xxxvii. 20240913_PSC_Order

2 Solar Electric Power – 'Know-how'

Earth receives energy from the sun in the form of heat and light. It is possible for the light energy received to be converted into electricity using a device called a solar cell or photovoltaic cell (PV Cell for short). A solar cell receives 'Photons' from sunlight which then produces Electric 'Volts' thus giving these devices the name 'Photovoltaic'.

A simple solar cell is relatively small and can only produce a couple watts of electricity, which is not sufficient for large-scale utilization. To increase the power production, several cells are combined to form a 'Solar Module', which can produce a usable amount of electricity. A 'Solar System' is when several solar modules are arranged systematically for large-scale power production.

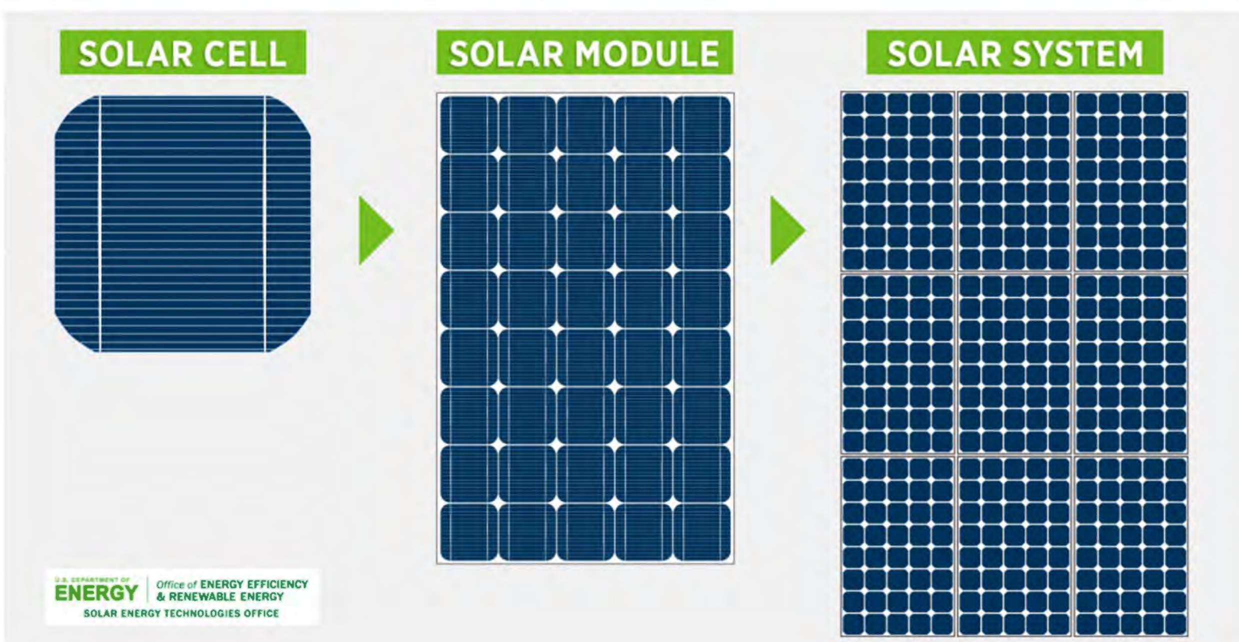


Figure (1)
Solar System[1]

For electricity generated by Solar systems to be utilized, it first must be connected to the regional electric grid. Once the solar system is connected to the electric grid it can then be distributed to consumers. This is achieved by constructing a solar power plant with the use of a solar panels, in which the quantity and arrangement of solar modules is determined from the electrical system

[1] Picture from the official website of 'Office of Energy Efficiency & Renewable Energy'

design of the plant and is then connected to the regional electric grid for distribution to the consumer.

2.1 Solar Power Plant

A Solar Power plant is an electric power plant constructed for generating electric power using solar modules. A Solar Power Plant consists of a solar system and the other associated electrical and plant equipment for transmitting the energy generated.

Figure (2)
A Solar Power Plant[2]

Some of the commonly seen equipment in a solar power plant are,

i) Solar Modules
ii) Inverters,
iii) Batteries
iv) Power transformer,
v) High voltage Circuit breakers, Fuses and Other protection equipment
vi) Utility Metering equipment
vii) Electrical Conductors &
viii) Steel & Concrete structures,

[2] Image found from industrial-on-grid-scheme.png (1600×1546) (avenston.com)

A Solar Power plant, constructed by a private entity, after making Power Purchase Agreements (PPA) with the local Electric Power grid to supply electric power, is known as a 'Merchant Electric Solar Power Plant'.

2.2 Role of Solar Modules

As stated earlier a Solar Module which is 'Photovoltaic', uses 'Photons' that are absorbed from sunlight to then produce electric power. This electric power is unidirectional in nature and requires additional equipment such as Inverters and Transformers for Electric Power Utilization.

Besides the additional equipment, the Solar modules are manufactured with the ability to track the sun to increase their efficiency.

Picture (3)
Solar Modules Installed on Farmland[3]

2.3 Role of Inverters

The power produced by a solar system, because of its basic principle of operation, is unidirectional and is in the form of Direct Current or in short, DC. This form of DC Power is not

[3] Refer to PV magazine Molong Solar Farm nolonger in development, successfully energised – pv magazine Australia (pv-magazine-australia.com)

suitable for utilization. The DC power should be converted to Alternating current, AC for utilization.

A 'Solar inverter' or a 'PV inverter' is a power electronic device which converts the DC Power generated by the Solar system, into AC Power. This AC Power is then transmitted to the electrical grid for power distribution.

Picture (4)
Industrial Solar Inverter[4]

2.4 Role of Batteries

As a Solar system can produce electric power only when the sunlight is available. It is because of this drawback a Solar power plant cannot produce electricity during night. In order to overcome this drawback Solar power plants are installed with batteries so that some portion of electricity produced by the solar modules during the day is stored in the batteries and retrieved during night.

The Solar Modules and the Batteries function on DC. A proper combination of Solar Modules and

[4] Refer to PV magazine SMA reaches 10 GW of installed Sunny Central inverters in North America – pv magazine USA (pv-magazine-usa.com)

Batteries can produce electricity all day long.

Picture (5)
GE Industrial Battery[5]

2.5 Role of Transformers and Other associated switchyard equipment

A Transformer is an electrical power equipment which is used either to step-up or to step-down the voltage of an electrical power source without changing the frequency of the voltage. A Transformer is an AC power equipment.

In a Solar Power plant, the power produced by the solar modules is converted into the useful form of AC by Inverters. The AC Power produced by inverters are at a relatively lower voltage comparted to the voltage available at the electric power grid. A Transformer, which can step-up the voltage to match it with the grid, is used to overcome the difference in voltages and to establish an interconnection for the supply of power.

In a large Solar Power plant, every Inverter is installed with a Transformer locally to the inverter, to step-up the voltage to a medium level, other than the voltage available at the grid. This is done

[5] Refer to PV magazine GE to supply 100 MW/300 MWh battery for South Australia solar farm – pv magazine International (pv-magazine.com)

to form a network of Transformers to collect the power coming from each Inverter.

This Electric network of transformers will have one high-capacity Main Transformer, which does the final step-up for the connection with the grid.

Besides the Transformers, Solar Power plants are installed with some other electrical equipment like,

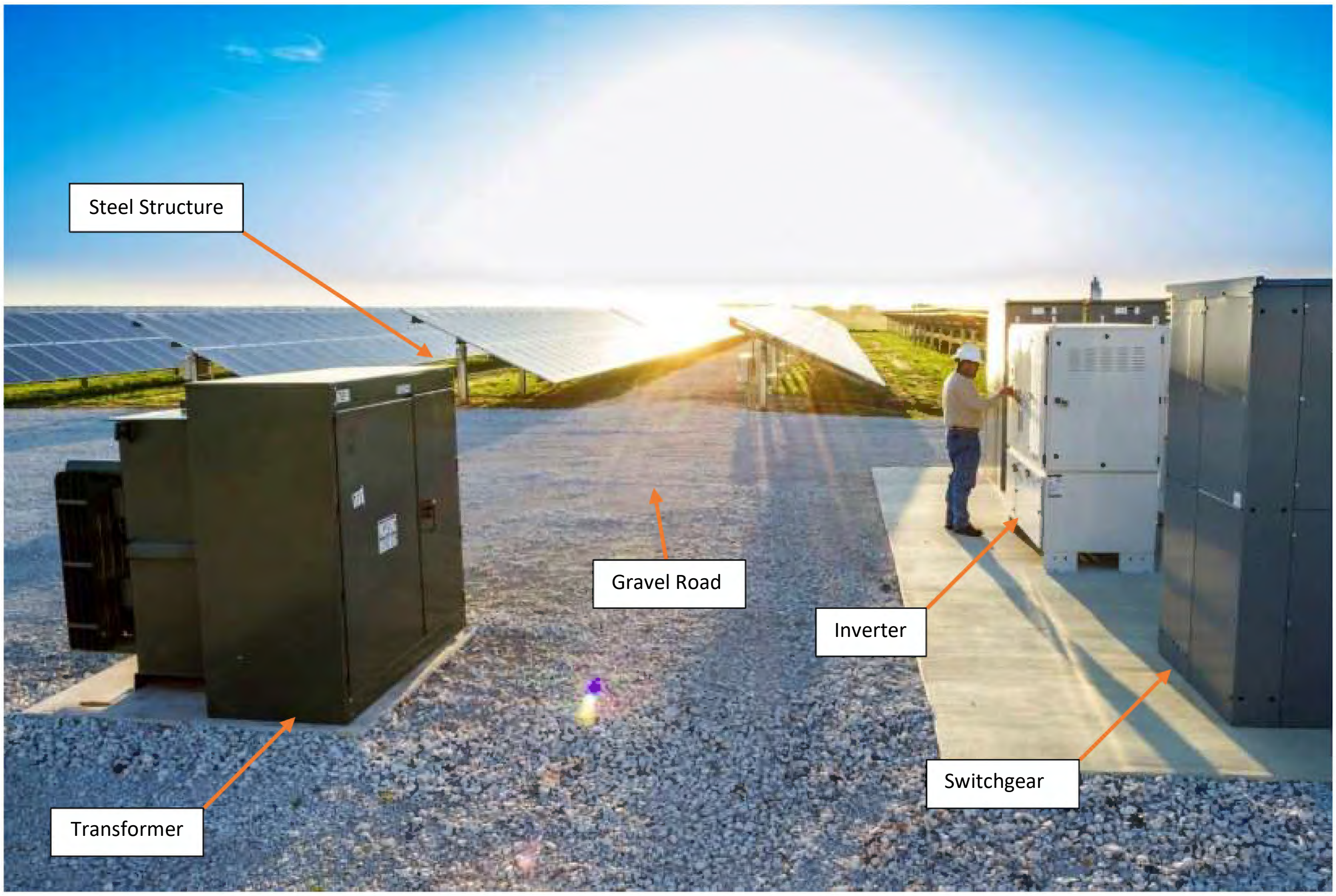
i) Electric Switchgear
ii) Electric Bus system
iii) Electric Protection system &
iv) Electric Energy measurement system

Picture (6) Substation Transformer[6]

[6] Image found from the following website Transformer substation THE TRENT - The Trent (thetrentonline.com)

2.6 Role of Steel & Concrete Structures, Roadways & Fencing

Steel & Concrete structures are necessary structures for the installation of solar modules and all other necessary electrical equipment. Roadways provide access to the modules for site personnel for work to be completed for maintenance and general site operation. Fencing is installed at solar facilities to determine the boundary of the facility, safety, as well as controlling who has access to the facility.



Picture (7)
Steel & Concrete Structures of a 2MW Solar farm[7]

[7] Image found from the following website
https://www.energy.gov/eere/solar/solar-integration-inverters-and-grid-services-basics

2.7 General Effects of Solar Power Plants

2.7.1 Noise from the Equipment

In a Solar power plant, the Solar Inverters and the Power Transformers are the main sources of noise. The cooling fans mounted on the Inverters and the Transformers are responsible for the majority of the noise. However, the noise produced by this equipment are effective only in the vicinity of the equipment and decay with the distance. When this equipment is located appropriately in the plant the effect of noise can be minimized.

2.7.2 Increased Road Traffic, Noise and Fugitive dust

The Solar Powerplant is a plant with stationary equipment producing energy based on the photovoltaic effect. There will not be any transportation of raw material or the plant wastage for the Solar power plant. Hence, Solar power plants do not increase the Traffic, Noise and Fugitive dust during the operation. However, during construction there will be considerable traffic of construction vehicles transporting the equipment of the plant. Necessary mitigation measures must be taken to avoid traffic congestion, Noise and Fugitive dust during the construction of the Solar Power plant.

2.7.3 Environmental and Wildlife

Solar energy systems/power plants do not produce air pollution or greenhouse gases. In fact, solar energy consumption can have a positive indirect effect on the environment and reduces the use of other energy sources that have larger effects on the environment. However, some toxic materials and chemicals are used to make the photovoltaic (PV) cells of the Solar modules.

There has been a relatively low number of studies that have been done on how solar facilities affect wildlife. However, the following methods can be adopted to minimize the impact of Solar power plants on wildlife[8],

i) Avoid areas of high native biodiversity and high-quality natural communities
ii) Allow for wildlife connectivity, now and in the face of climate change
iii) Preferentially use disturbed or degraded lands
iv) Protect water quality and avoid erosion
v) Restore native vegetation and grasslands

[8] Making Solar Wildlife-Friendly
Creating solutions to maximize conservation benefit from solar production
https://www.nature.org/en-us/about-us/where-we-work/united-states/north-carolina/stories-in-north-carolina/making-solar-wildlife-friendly/

vi) Provide wildlife habitat

2.7.4 Farming land

One of the biggest concerns with solar farms built on farmland is the effects they will have on the land once all the panels and associated equipment are removed from the site, as well the effect on local wildlife species and the ability for the land to be used with domesticated animals.

The land occupying a solar farm can be reverted to agricultural uses once the project has reached the end of its operational life. The life of a solar installation is roughly 20-25 years and can provide a recovery period, increasing the value of that land for agriculture in the future. Giving soil rest can also maintain soil quality and contribute to the biodiversity of agricultural land. [9]

Silicon-based photovoltaic cells (PV) are the type of PV cells commonly used. Most solar panels are manufactured with a glass front that protects the PV cell as well as either a aluminum or steel frame. Research shows that traces metals leaching from solar modules is unlikely to present a significant risk due to the sealed nature of the PV cells. Some manufacturers use cadmium telluride (CdTe). Cadmium compounds are toxic, but studies show that these compounds cannot be emitted from CdTe modules during normal operation or even during fires. Industrial incineration temperatures, which are higher than grassfires, are required to release the compounds from the modules. [10]

During the Plant operation, Solar farms can be used to graze domestic animals such as sheep, which are commonly used to control vegetation at the facility as they do not climb on or damage the PV modules. It is not necessary to raise the PV modules in height to accommodate grazing as vegetation is accessible beneath the modules at the standard mounting heights. When sheep are used for grazing to control vegetation growth it can benefit local shepherds, the solar operators, and the land due to a reduction in mowing, herbicide, and other management needs. Cattle grazing is generally not compatible with PV facilities due to the risk of damage to the modules. Wild animals can graze under PV modules; however, security fences can be installed to increase the security of the facility as well as keeping out larger animals if they are deemed to be a damage risk to the modules. Fencing can be built to accommodate smaller animals such as foxes. The areas below the PV modules can be built to provide a habitat and forage to pollinators, birds, and other small species.[11]

[9] Farmer's Guide to Going Solar https://www.energy.gov/eere/solar/farmers-guide-going-solar
[10] Farmer's Guide to Going Solar https://www.energy.gov/eere/solar/farmers-guide-going-solar
[11] Farmer's Guide to Going Solar https://www.energy.gov/eere/solar/farmers-guide-going-solar

3 Weirs Creek Solar – Application Review & Findings

The present document, as mentioned in the previous sections, is the final report created after reviewing the application documents submitted by the applicant, Weirs Creek Solar.

In this section, a detailed discussion is made on the Initial review, Site visit and the Final review from Elliot Engineering.

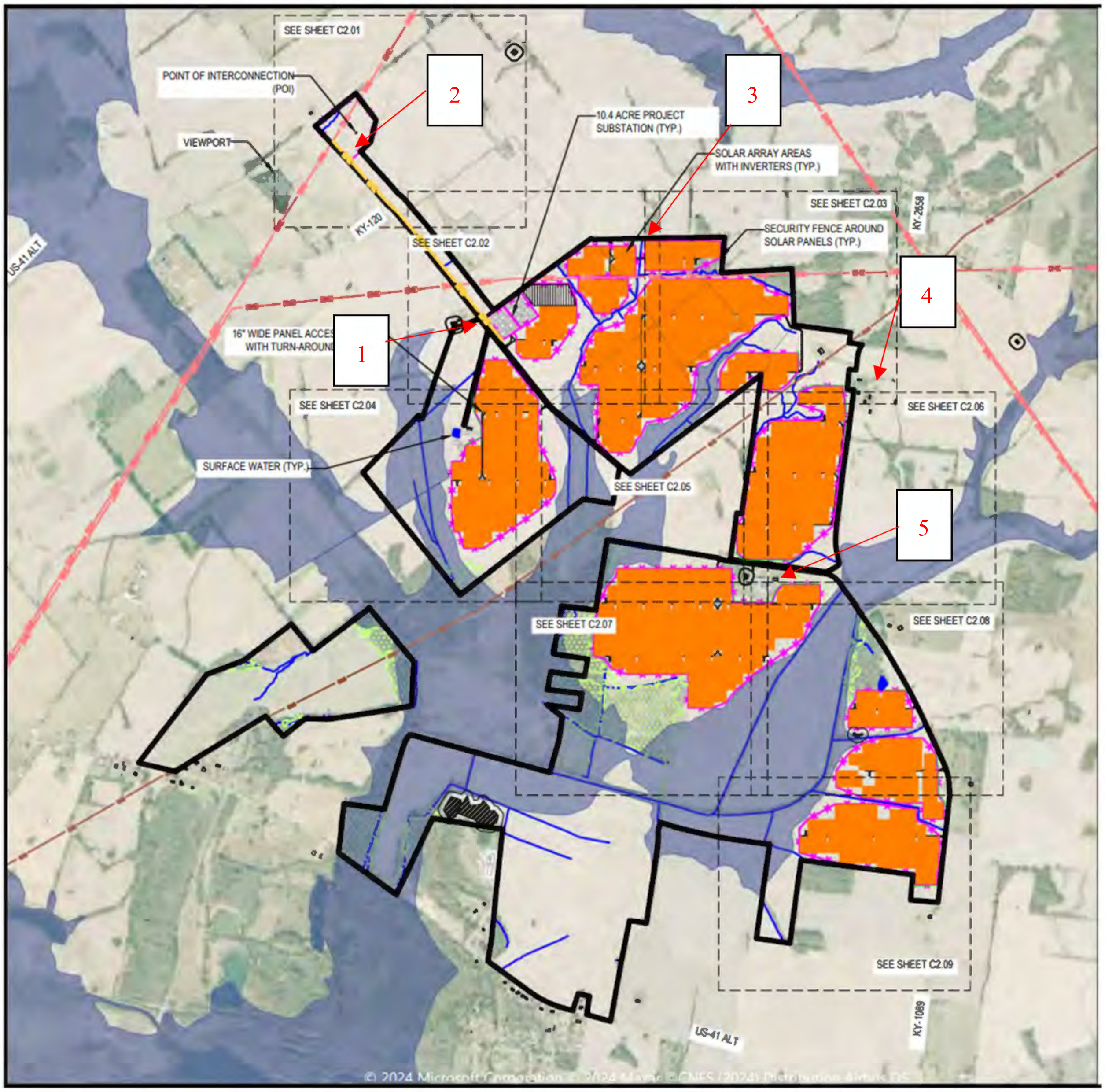
3.1 Initial Review

Elliot Engineering and its Consultants working on the Siting Project review the applicant document for their adequacy, as part of the requirements of the state order for the applicant's Case No. 2024-00099. After the initial review of the application documents, a list of statements was submitted from First and Second Requests for Information.

3.2 Site Visit

As part of the requirements of the state order, for the applicant's Case No. 2024-00099, Elliot Engineering made a visit to site as organized by the Siting board, on August 14^{th}, 2024.

The locations visited are indicated on the picture below Reference Picture (8).



Picture (8) Weirs Creek Solar Site Visit Locations

Pictures from the site visit are shown in the following pages.

Picture (9) Stop 1 – View 1

Picture (10) Stop 1 – View 2

Picture (11) Stop 1 – View 3

Picture (12) Stop 2 – View 1

Picture (13) Stop 2 – View 2

Picture (14) Stop 2 – View 3

Picture (15) Stop 2 – View 4

Picture (16) Stop 3 – View 1

Picture (17) Stop 3 – View 2

Picture (18) Stop 3 – View 3

Picture (19) Stop 3 – View 4

Picture (20) Stop 4 – View 1

Picture (21) Stop 4 – View 2

Picture (22) Stop 4 – View 3

Picture (23) Stop 4 – View 4

Picture (24) Stop 5 – View 1

Picture (25) Stop 5 – View 2

Picture (26) Stop 5 – View 3

Picture (27) Stop 5 – View 4

Picture (28) Stop 5 – View 5

Picture (29) Stop 5 – View 6

3.3 Final Review

In this section a detailed discussion is made on the major aspects of the application documents submitted for their compliance as per the statutes KRS 278.706, 708 & 710

3.3.1 Review of Application documents

Accordant with KRS 278.706 the applicant, Weirs Creek Solar, submitted the application documents and a Site Assessment Report addressing the compliances on different requirements of KRS 278.708.

As per KRS 278.708(3) the Site Assessment Report shall include the following

(a) A description of the proposed facility that shall include a proposed site development plan that describes:
   1) Surrounding land uses for residential, commercial, agricultural, and recreational purposes.
   2) The legal boundaries of the proposed site.
   3) Proposed access control to the site.
   4) The location of facility buildings, transmission lines, and other structures.
   5) Location and use of accessways, internal roads, and railways.
   6) Existing or proposed utilities to service the facility.
   7) Compliance with applicable setback requirements as provided under KRS 278.704(2), (3), (4), or (5).
   8) Evaluation of the noise levels expected to be produced by the facility.

(b) An evaluation of the compatibility of the facility with scenic surroundings.

(c) The potential changes in property values and land use resulting from the siting, construction, and operation of the proposed facility for property owners adjacent to the facility.

(d) Evaluation of anticipated peak and average noise levels associated with the facility's construction and operation at the property boundary.

(e) The impact of the facility's operation on road and rail traffic to and within the facility, including anticipated levels of fugitive dust created by the traffic and any anticipated degradation of roads and lands in the vicinity of the facility.

As per KRS 278.710(1)(c) the 'Economic Impact of the facility' is studied for granting a Construction Certificate.

3.3.2 278.708(3)(a)(1) Surrounding Land Uses

Elliot Engineering reviewed the Site Layout and maps submitted by the applicant and visited the site on August 14th, 2024. The findings after the site visit are discussed below.

Findings on the Site Layouts & maps

1) Underground communication lines should be identified at the time of construction.

3.3.3 278.708(3)(a)(2) Legal Boundaries

The documentation on the legal description of the land was found to be adequate as part of the application. However, any discrepancy identified at any stage of the project shall be brought to the attention of the Public Service Commission and resolved for legal compliance.

3.3.4 278.708(3)(a)(3) Proposed Access Control

As per the KRS requirements KRS 278.708 (3)(a)(3), the applicant has proposed the access control methods that are adopted for the site.

Finding on Proposed Access Control:

1) At the time of construction and operation of the plant, besides providing fencing (as proposed by the applicant), all necessary signage, caution boards and safety requirements as per OSHA shall be installed.

3.3.5 278.708(3)(a)(4) Location of Facility Buildings & Transmission Lines

After reviewing the Site Layout and other plans submitted by the applicant and after visiting the site, the following findings were made.

Findings on Location of Facility Buildings and Transmission lines.

1) Existing Electric services:
   Any new power line should be clear of the existing electric service line, power pole and guy wire. This project includes a planned 0.85-mile nonregulated transmission line connecting the collector substation to the Point of Interconnection (POI) on the Hopkins-Reid 161kV line owned and operated by Big Rivers Electric Corporation. NERC and utility guidelines should be followed for the installation.
2) The Substation will need oil containment for the Transformer to prevent any leakage of oil into nearby bodies of water.

3.3.6 278.708(3)(a)(5) Location and Use of Accessways, Internal Road & Railways

As part of the site visit, major access points are visited, and the following findings were made.

Findings on Location and Use of Accessways, Internal Road & Road

1) The internal roads are proposed to be all-weather gravel.
2) Avoid using Oversize trailers for material transport and limit the overall weight as per the bridges and culverts of the surrounding roads. Install new culverts if necessary.

3) Weight limits of the roads should be considered when delivering heavy material loads for the project.

Picture (30) Map showing locations of bridges and culverts around the project site. NBI numbers taken from https://maps.kytc.ky.gov/bridgedataminer/

Picture (31) Culvert Along Donaldson Road

Picture (32) Culvert Along US-41

Picture (33) Bridge along US-41 (NBI:117B00115N)

Picture (34) Bridge along US-120 (NBI:117B00031N)


Picture (35) Bridge along Donaldson Road (NBI:064B00194N)


Picture (36) Bridge along Donaldson Road, Crossing Weirs Creek (NBI:054B00193N)

3.3.7 278.708(3)(a)(6) Existing or Proposed Utilities to Service the Facility

After reviewing the plot plans submitted by the applicant, it was found that the drawings do not indicate if the substation control house will have utilities. The applicant has not indicated if water, internet, or phone connection will be provided to the site. As applicable, there should be necessary drawings created indicating all underground, overhead utilities required to site at the time of construction.

3.3.8 278.708(3)(a)(7) Compliance with Applicable setback requirements

The KRS required setback is 2000 feet. This setback is practical for turbine-based plants but not practical for a solar power plant. After reviewing the application documents, Layouts & Maps, it was found that the following setback distances are followed,

100' from all occupied structures
25' from non-participating parcels
450' from central inverters to all occupied structures
50' from edge of road pavement

3.3.9 278.708(3)(a)(8); (b); (d) & (e) Evaluation of Noise levels, Scenic surroundings, Environmental impact & Fugitive Dust

Elliot Engineering has appointed Thomas Chaney for the Environmental Assessment of site for Noise, Scenic surroundings, historic and archeological, Environmental & Fugitive dust. The summary of review is as below,

Summary: "At its conclusion this adequacy report shows that the application submitted by the applicant, Weirs Creek Solar LLC is fully in compliance with the intent of the Kentucky Revises Statues."

Reference Attachment-A for complete report from Cloverlake Consulting.

3.3.10 278.708(3)(c) Property Values

Elliot Engineering has appointed Clark Toleman for the assessment of the Application document for the impact on Property Values. The conclusion is described below.

Summary: "Considering my analysis of the CohenReznick Impact Study I have concluded that the report is credible and representative of the market conditions that would exist should the Weirs Creek Solar Project be constructed bas4ed on the market evidence and interpretation of the data contained in the Impact Study. The report includes a review of published studies on property value impacts associated with solar projects, paired sales analysis in ten comparable solar projects ranging in size from 40 to 239 MW, and interviews with real estate professionals and real property assessors."

Reference the Attachment-B for complete report from, E. Clark Toleman MAI, SRA.

3.3.11 278.710(1)(c) Economic Impact Analysis

Economic Impact Analysis was performed by Mark Watters, as contracted by Elliot Engineering, for the Site Assessment.

Summary: "The Economic Impact & Land Use Analysis of the Weirs Creek Solar Project (the "Report") stands out as an outstanding model for such analyses of economic impact. The report is thorough, organized, and complete, and its narrative and findings well supported.

Based upon the representations of the Applicant through its Report, there is a positive, significant, short-term initial economic during the Construction Phase for the Commonwealth of Kentucky, Webster, and Hopkins Counties, and their regions. During the longer Operational (generation) phase, there are likewise positive economic impacts for the region and the state."

Reference the Attachment-C for complete report from Mark M. Watters.

4 Recommendations & Mitigations Measures

After reviewing the application documents and performing the site visit, Elliot Engineering provides the following Recommendations & Mitigation measures.

1. Create an over-all plot plan indicating all water bodies, bridges, railroad crossings, culverts, access roads, power lines, residential and public structures, etc.
2. For locating the Solar Modules and Other associated equipment of the plant maintain sufficient clearance from any existing power lines.
3. Construct new bridges or culverts wherever necessary for equipment transportation.
4. Coordinate with surrounding nonparticipating landowners to limit the impact of oversized loads delivered to the project (Ex. Project Transformer).
5. Leaving existing vegetation between solar equipment and neighboring residences in place, to the extent practicable, to help screen the Project and reduce the visual impact.
6. Notices to neighbors regarding potential construction and operation noises, as well as limits on working hours during the construction period, as described in the Application.
7. Applicant to create or maintain (if existing) open lines of communication with owners/operators of the active mine permits in the project area to ensure that project construction does not interfere with mine stability and or safety.
8. Fugitive Dust and PM10(Coarse particles)
   Coarse (bigger) particles, called PM10, can irritate your eyes, nose, and throat. Dust from roads, farms, dry riverbeds, construction sites, and mines are types of PM10. The applicant will submit in writing the specific plan to control fugitive dust and PM 10 during the construction process ten days prior to commencing construction.

4.1 Cumulative effect of the Total Solar generation on the Grid

Solar developments are rapidly increasing and while the impact to the surrounding environment might be minimal, the combined or cumulative effects of multiple developments may have a greater impact. Environmental concerns due to cumulative impacts, such as Glint, Glare and emission are expected to grow.

The proposed project would create air emissions due to vehicle and dust emissions associated with development activities. Similar effects would be experienced during decommissioning, which would be carried out according to the project's restoration plan.
Generating electricity using solar rather than fossil fuels reduce greenhouse gas emissions and helps address climate change. While solar energy is preferable to fossil fuel generators from an emissions perspective, power output from solar energy sources depends on variable natural resources, which makes these plants more difficult to control and presents challenges for grid

operators.

As the electricity from solar energy can be produced only during daytime, the Solar Power projects have the inherent risk of unavailability during nighttime. The utilities and the transmission planning authorities shall identify the risks associated with this and plan the intake of the energy from Solar plants effectively.

To accurately balance electricity supply and demand on the power grid, grid operators must understand how much solar energy is being generated at any given time, how much solar energy generation is expected, and how to respond to changing generation. This can be challenging for grid operators due to the intermittent nature of solar energy and the wide variety in the size and locations of solar energy across the power grid. As the proportion of solar energy capacity on the grid increases, these issues are becoming increasingly important to understand renewables connect to the grid, how these connections impact grid operations, and implications of a high penetration of renewables for the grid in the future.

Wells Engineering delivers innovative solutions aligned with rigid standards and best engineering practices.

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