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April 25, 2023

Melanie A. Bachman, Esq.
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Petition No. 1558 - Community Power Group LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 4-megawatt AC solar photovoltaic electric generating facility located at 24 Middle Road, Ellington, Connecticut, and associated electrical interconnection.

Dear Ms. Bachman:

Enclosed for filing with the Connecticut Siting Council ("Council") are Community Power Group LLC's ("CPG" or the "Company") responses to the Council's second set of interrogatories dated April 6, 2023.

An original and fifteen (15) copies of this filing will be mailed via first-class mail to the Council.

Should you have any questions regarding this filing, please do not hesitate to contact me.

Very truly yours,

Bruce L. McDermott

Enclosures

Murtha Cullina LLP
265 Church Street
New Haven, CT 06510
T 203.772.7700
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Interrogatory CSC-47

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-47: Provide a one-line diagram of the interconnection facilities identifying both overhead and underground equipment.

A-CSC-47: Please see Exhibit CSC-47-1.

Interrogatory CSC-48

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-48: Referring to Interrogatory Response 20, have there been any discussions with Eversource to use pad-mounted equipment rather than pole-mounted equipment?

A-CSC-48: The project was studied by Eversource with its interconnection scheme that calls for pole mounted equipment. To explore a pad mounted interconnection would require Community Power Group to conduct a new system study and interconnection design. Community Power Group has not commissioned Eversource to restudy the project to use pad-mounted equipment.

Interrogatory CSC-49

Q-CSC-49: Provide cost estimates for both an overhead and underground interconnection.

A-CSC-49: Community Power Group is not able to provide a cost estimate for an underground interconnection as Eversource conducts those studies and it chose to study it using its standard overhead interconnection. Please see Exhibit CSC-49-1 for the cost estimate provided by Eversource for the overhead connection that was approved.

Interrogatory CSC-50

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-50: Is it possible to relocate the overhead interconnection to the property frontage on Pinney Street?

A-CSC-50: Moving the point of interconnection to the Pinney Street frontage would limit the agricultural uses of the field on the east side of the property. Additionally, running the medium voltage line from the project area to Pinney Street would involve some tree and brush clearing of the area between the two plowed fields. Lastly, moving the point of interconnection to the Pinney Street frontage would require Community Power Group to start a new interconnection study process which is extremely costly and would take more than a year to complete.

Interrogatory CSC-51

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-51: Referring to Interrogatory Response 25, what would be the collective noise level from the two transformers at the nearest property line?

A-CSC-51: The nearest property line to the transformers is approximately 249.6 feet away from the solar facility fence. Two identical sounds next to each result in double the intensity of the sound, that is an additional 3 decibels to the measured noise of the transformer of 65 dBa at 1 meter away. Based on the law of sound attenuation, the resulting sound of two transformers next to each other at the nearest property line would be 30.4 decibels, which is less than the applicable maximum noise limits listed in the Regulations of Connecticut State Agencies and it is the equivalent of a quiet rural area.

Interrogatory CSC-52

Q-CSC-52: What type of media and/or specialized equipment would be necessary to extinguish a solar panel/electrical component fire?

A-CSC-52: No specialized equipment is necessary to extinguish a solar panel/electrical component fire. The disconnect switches for the facility will be clearly labeled for emergency personnel to be able to locate it quickly in the event of a fire which is the first step. Using water in a fog pattern is the most common practice to extinguish a solar facility fire.

Interrogatory CSC-53

Q-CSC-53: Would CPG be required to file a Federal Aviation Administration Form 7460 if a small crane, excavator, or other tall equipment is used at site during construction?

A-CSC-53: Construction notices are required to be provided to the FAA under the following conditions:

Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

(1) 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport with its longest runway more than 3,200 ft. in actual length, excluding heliports.

(2) 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport with its longest runway no more than 3,200 ft. in actual length, excluding heliports.

(3) 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport.

Though these conditions do not apply to this project, Community Power Group agrees with the Connecticut Aviation Administration that it is best practice to do so, and has completed a filing for a small crane and excavator. Community Power Group is currently waiting on results of the Form 7460 review by the Federal Aviation Administration.

Interrogatory CSC-54

Q-CSC-54: Identify the distance/direction of the nearest federally-obligated airport from the proposed site.

A-CSC-54: The closest federally-obligated airport is Bradley International Airport which is located approximately 10.17 miles west/northwest of the facility.

Interrogatory CSC-55

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-55: Identify the distance/direction of the Ellington Airport and Skylark Airport from the proposed site.

A-CSC-55: Ellington Airport is 2.43 miles northeast directly from the proposed project site and Skylark Airport is approximately 5.05 miles northwest directly from the proposed facility.

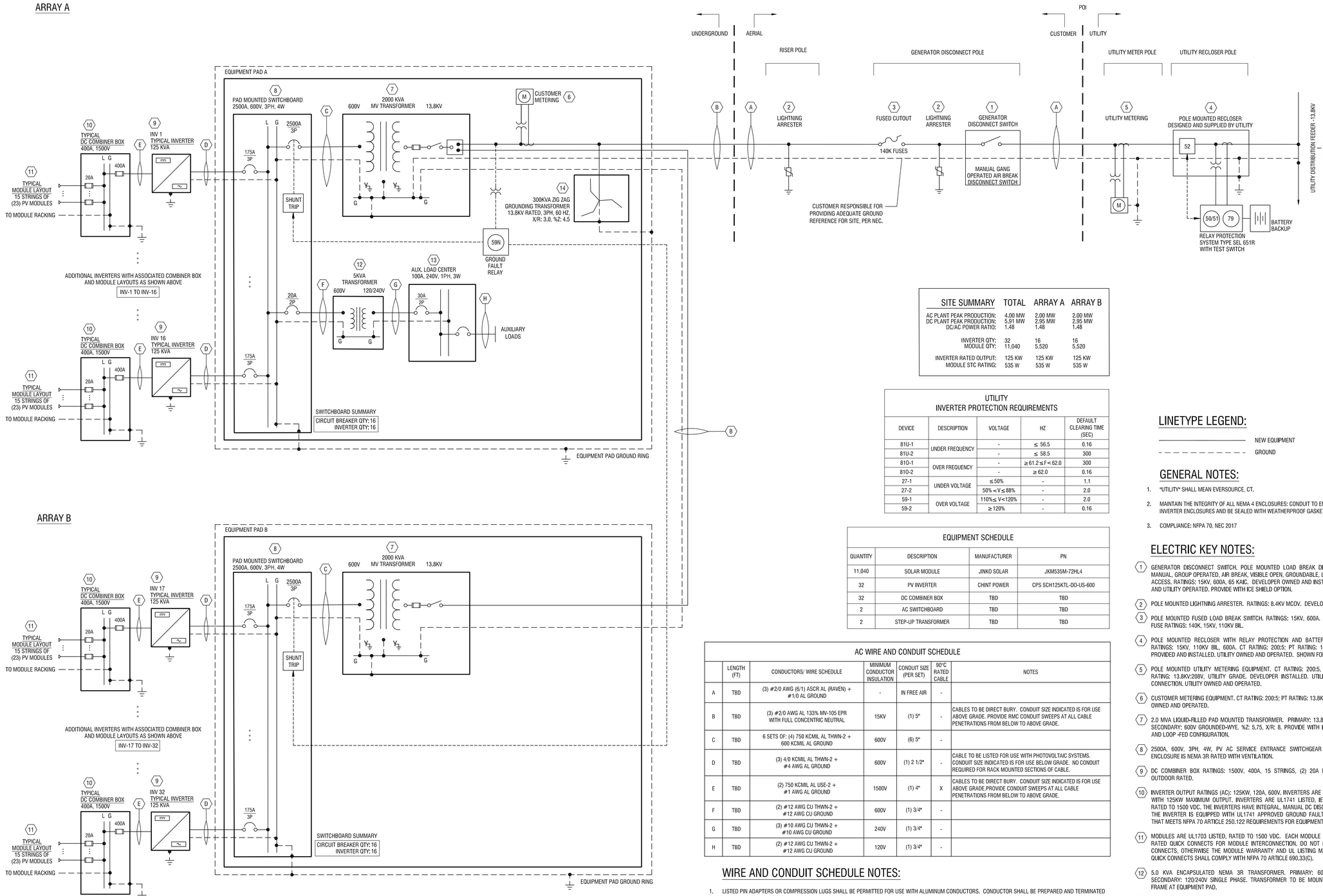
Interrogatory CSC-56

Community Power Group, LLC
Petition No. 1558

Witness: Michael Borkowski

Q-CSC-56: Provide an aviation glare analysis.

A-CSC-56: Please see Exhibit CSC-56-1 which consists of flight path glare simulations for Skylark Airport and Ellington Airport that was run after a consultation with the Connecticut Airport Authority, Skylark Airport, and Ellington Airport. No glare was predicted.



SITE SUMMARY	TOTAL	ARRAY A	ARRAY B
AC PLANT PEAK PRODUCTION:	4.00 MW	2.00 MW	2.00 MW
DC PLANT PEAK PRODUCTION:	5.91 MW	2.95 MW	2.95 MW
DC/AC POWER RATIO:	1.48	1.48	1.48
INVERTER QTY:	32	16	16
MODULE QTY:	11,040	5,520	5,520
INVERTER RATED OUTPUT:	125 KW	125 KW	125 KW
MODULE STC RATING:	535 W	535 W	535 W

UTILITY
INVERTER PROTECTION REQUIREMENTS

DEVICE	DESCRIPTION	VOLTAGE	HZ	DEFAULT CLEARING TIME (SEC)
81U-1	UNDER FREQUENCY	-	≤ 56.5	0.16
81U-2		-	≤ 58.5	300
81O-1	OVER FREQUENCY	-	≥ 61.2 ≤ F < 62.0	300
81O-2		-	≥ 62.0	0.16
27-1	UNDER VOLTAGE	≤ 50%	-	1.1
27-2		50% < V ≤ 88%	-	2.0
59-1	OVER VOLTAGE	110% ≤ V < 120%	-	2.0
59-2		≥ 120%	-	0.16

EQUIPMENT SCHEDULE

QUANTITY	DESCRIPTION	MANUFACTURER	PN
11,040	SOLAR MODULE	JINKO SOLAR	JKM535M-72HL4
32	PV INVERTER	CHINT POWER	CPS SCH125KTL-DO-US-600
32	DC COMBINER BOX	TBD	TBD
2	AC SWITCHBOARD	TBD	TBD
2	STEP-UP TRANSFORMER	TBD	TBD

AC WIRE AND CONDUIT SCHEDULE

	LENGTH (FT)	CONDUCTORS/ WIRE SCHEDULE	MINIMUM CONDUCTOR INSULATION	CONDUIT SIZE (PER SET)	90°C RATED CABLE	NOTES
A	TBD	(3) #2/0 AWG (6/1) ASCR AL (RAVEN) + #1/0 AL GROUND	-	IN FREE AIR	-	
B	TBD	(3) #2/0 AWG AL 133% MV-105 EPR WITH FULL CONCENTRIC NEUTRAL	15KV	(1) 5"	-	CABLES TO BE DIRECT BURY. CONDUIT SIZE INDICATED IS FOR USE ABOVE GRADE. PROVIDE RMC CONDUIT SWEEPS AT ALL CABLE PENETRATIONS FROM BELOW TO ABOVE GRADE.
C	TBD	6 SETS OF: (4) 750 KCMIL AL THWN-2 + 600 KCMIL AL GROUND	600V	(6) 5"	-	
D	TBD	(3) 4/0 KCMIL AL THWN-2 + #4 AWG AL GROUND	600V	(1) 2 1/2"	-	CABLE TO BE LISTED FOR USE WITH PHOTOVOLTAIC SYSTEMS. CONDUIT SIZE INDICATED IS FOR USE BELOW GRADE. NO CONDUIT REQUIRED FOR RACK MOUNTED SECTIONS OF CABLE.
E	TBD	(2) 750 KCMIL AL USE-2 + #1 AWG AL GROUND	1500V	(1) 4"	X	CABLES TO BE DIRECT BURY. CONDUIT SIZE INDICATED IS FOR USE ABOVE GRADE.PROVIDE CONDUIT SWEEPS AT ALL CABLE PENETRATIONS FROM BELOW TO ABOVE GRADE.
F	TBD	(2) #12 AWG CU THWN-2 + #12 AWG CU GROUND	600V	(1) 3/4"	-	
G	TBD	(3) #10 AWG CU THWN-2 + #10 AWG CU GROUND	240V	(1) 3/4"	-	
H	TBD	(2) #12 AWG CU THWN-2 + #12 AWG CU GROUND	120V	(1) 3/4"	-	

WIRE AND CONDUIT SCHEDULE NOTES:

1. LISTED PIN ADAPTERS OR COMPRESSION LUGS SHALL BE PERMITTED FOR USE WITH ALUMINUM CONDUCTORS. CONDUCTOR SHALL BE PREPARED AND TERMINATED PER MANUFACTURERS GUIDELINES.
2. ELECTRICAL CONTRACTOR SHALL IDENTIFY SOURCE WIRING WITH MARKING TAPE OR OTHER APPROVED METHOD. POSITIVE SHALL BE MARKED RED AND NEGATIVE MARKED BLACK. CONDUCTORS 4 AWG AND LARGER SHALL BE IDENTIFIED AT ALL TERMINATIONS. PROVIDE COMPRESSION LUGS AT BUS TERMINATIONS.
3. ALL PARALLEL CABLE SETS TO BE INSTALLED WITH GROUND CONDUCTORS IN EACH CONDUIT.
4. ALL CABLING EXPOSED TO SUNLIGHT TO BE RATED AS UV RESISTANT.
5. CONDUIT TO BE PVC SCHEDULE 40 UNLESS NOTED OTHERWISE.

LINETYPE LEGEND:

NEW EQUIPMENT

GROUND

GENERAL NOTES:

1. "UTILITY" SHALL MEAN EVERSOURCE, CT.
2. MAINTAIN THE INTEGRITY OF ALL NEMA 4 ENCLOSURES: CONDUIT TO ENTER PANEL AND INVERTER ENCLOSURES AND BE SEALED WITH WEATHERPROOF GASKETING.
3. COMPLIANCE: NFPA 70, NEC 2017

ELECTRIC KEY NOTES:

1. GENERATOR DISCONNECT SWITCH. POLE MOUNTED LOAD BREAK DISCONNECT SWITCH; MANUAL, GROUP OPERATED, AIR BREAK, VISIBLE OPEN, GROUNDABLE, LOCKABLE WITH 24/7 ACCESS. RATINGS: 15KV, 600A, 65 KAIC. DEVELOPER OWNED AND INSTALLED. DEVELOPER AND UTILITY OPERATED. PROVIDE WITH ICE SHIELD OPTION.
2. POLE MOUNTED LIGHTNING ARRESTER. RATINGS: 8.4KV MCOV. DEVELOPER OWNED.
3. POLE MOUNTED FUSED LOAD BREAK SWITCH. RATINGS: 15KV, 600A. DEVELOPER OWNED. FUSE RATINGS: 140K, 15KV, 110KV BIL.
4. POLE MOUNTED RECLOSER WITH RELAY PROTECTION AND BATTERY BACKUP POWER. RATINGS: 15KV, 110KV BIL, 600A, CT RATING: 200:5; PT RATING: 13.8KV:208V. UTILITY PROVIDED AND INSTALLED. UTILITY OWNED AND OPERATED. SHOWN FOR REFERENCE ONLY.
5. POLE MOUNTED UTILITY METERING EQUIPMENT. CT RATING: 200:5, UTILITY GRADE; PT RATING: 13.8KV:208V. UTILITY GRADE. DEVELOPER INSTALLED. UTILITY TO MAKE FINAL CONNECTION. UTILITY OWNED AND OPERATED.
6. CUSTOMER METERING EQUIPMENT. CT RATING: 200:5; PT RATING: 13.8KV:208V. DEVELOPER OWNED AND OPERATED.
7. 2.0 MVA LIQUID-FILLED PAD MOUNTED TRANSFORMER. PRIMARY: 13.8KV GROUNDED-WYE; SECONDARY: 600V GROUNDED-WYE. %Z: 5.75, X/R: 8. PROVIDE WITH INTEGRAL SWITCHES AND LOOP -FED CONFIGURATION.
8. 2500A, 600V, 3PH, 4W, PV AC SERVICE ENTRANCE SWITCHGEAR WITH 2500A MCB. ENCLOSURE IS NEMA 3R RATED WITH VENTILATION.
9. DC COMBINER BOX RATINGS: 1500V, 400A, 15 STRINGS, (2) 20A FUSES PER STRING, OUTDOOR RATED.
10. INVERTER OUTPUT RATINGS (AC): 125KW, 120A, 600V. INVERTERS ARE TO BE SET TO 1.0 PF WITH 125KW MAXIMUM OUTPUT. INVERTERS ARE UL1741 LISTED, IEEE1547 COMPLIANT, RATED TO 1500 VDC. THE INVERTERS HAVE INTEGRAL, MANUAL DC DISCONNECTING MEANS. THE INVERTER IS EQUIPPED WITH UL1741 APPROVED GROUND FAULT DETECTION DEVICE THAT MEETS NFPA 70 ARTICLE 250.122 REQUIREMENTS FOR EQUIPMENT GROUNDING.
11. MODULES ARE UL1703 LISTED, RATED TO 1500 VDC. EACH MODULE INCLUDES OUTDOOR RATED QUICK CONNECTS FOR MODULE INTERCONNECTION. DO NOT REMOVE THE QUICK CONNECTS, OTHERWISE THE MODULE WARRANTY AND UL LISTING MAY BE INVALIDATED. QUICK CONNECTS SHALL COMPLY WITH NFPA 70 ARTICLE 690.33(C).
12. 5.0 KVA ENCAPSULATED NEMA 3R TRANSFORMER. PRIMARY: 600V SINGLE PHASE; SECONDARY: 120/240V SINGLE PHASE. TRANSFORMER TO BE MOUNTED ON EQUIPMENT FRAME AT EQUIPMENT PAD.
13. 100A, 1PH, 3W, 12CKT AUXILIARY LOAD CENTER WITH 30A, 1P MCB. PANEL SHALL BE NEMA 3R RATED AND MOUNTED ON EQUIPMENT FRAME AT INVERTER EQUIPMENT PAD.
14. PAD MOUNTED 300KVA ZIG ZAG GROUNDING TRANSFORMER. 13.8KV PRIMARY, 3 PHASE, 60 HZ. X/R: 3.0, %Z: 4.5, 115°C RISE, ONAN, 110KV BIL. NEMA 3R ENCLOSURE. SECONDARY CONTINUOUS NEUTRAL CURRENT: 33.5A. ALLOWABLE SHORT CIRCUIT CURRENT FOR 10 SEC: 327A.

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STATE OF CONNECTICUT · STEVEN MICHAEL LONGWAY · No. 31665 · LICENSED PROFESSIONAL ENGINEER

COMMUNITY POWER GROUP

5636 CONNECTICUT AVE, #42729
WASHINGTON DC 20015

24 MIDDLE - ELLINGTON SOLAR PROJECT

4.0 MW ARRAY

24 MIDDLE ROAD,
ELLINGTON, CT 06029

GPS COORDINATES:
41.89478, -72.48407

NO:	DATE:	DESCRIPTION:
REVISIONS		

PROJECT NUMBER: 2210754

DRAWN BY: APP

REVIEWED BY: SJB

ISSUED FOR: SIR SUBMISSION

DATE: FEBRUARY, 2021

DRAWING NAME: SINGLE LINE DIAGRAM

DRAWING NUMBER: E101

Appendix G
Attachment 1

EDC's Description of its Upgrades and Best Estimate of Upgrade Costs

Item	Description	Cost	Notes No.
1.	New Service and recloser	$199,041	
2.	**Subtotal**	**$199,041**	
3.	CIAC - 11%, (Contribution in Aid of Construction)	$21,895	
4.	Subtotal with CIAC	$220,936	
5.	Witness Test	$2,000	
6.	**Total Construction cost** Note: Additional escalation cost of 4% will apply per year for payment after 2022	**$222,936**	

TABLE 1

General comments:

1. Line work may require consent from property owners in compliance with CT Statute. The proposed schedule of milestones as outlined in appendix F of the IA assumes that such approval will be secured with no opposition and does not include any delays or legal fees associated with securing such approval.
2. In the event that you are unable to meet the schedule of milestones in appendix F of the IA a revised schedule of milestones will be re-submitted to you. It is important to note that a slip in schedule may not result in an equal delay (one to one delay). Schedules are based on availability of man power, resources and the ability to schedule outages which can be curtailed during the summer season.
3. Price is based on Impact study with an accuracy of +/- 25% (If a Facility Study was performed delete this note)
4. Escalation cost of 4% will apply per year for payment after 2022.

Agreed to by:

Generator  **Date:** 3/27/23

Eversource Energy _____ **Date:** _____

FORGESOLAR GLARE ANALYSIS

Project: **Ellington Solar Farm**
Site configuration: **24 Middle - 4MW SAT-temp-0**

Created 04 Nov, 2022
Updated 10 Apr, 2023
Time-step 1 minute
Timezone offset UTC-5
Site ID 78755.13960
Category 1 MW to 5 MW
DNI peaks at 1,000.0 W/m^2
Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	12,210,000.0

Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Abbott Road	0	0.0	0	0.0
Middle Road	0	0.0	0	0.0
Pinney Street	0	0.0	0	0.0
FP 1- Skylark	0	0.0	0	0.0
FP 2-Skylark 2	0	0.0	0	0.0
FP 3-Ellington	0	0.0	0	0.0
FP 4-Ellington 2	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: None
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Rated power: 4000.0 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.890839	-72.488840	273.63	12.00	285.63
2	41.891949	-72.489044	258.53	12.00	270.53
3	41.892141	-72.487456	266.85	12.00	278.85
4	41.893155	-72.487627	279.20	12.00	291.20
5	41.893699	-72.484098	254.73	12.00	266.73
6	41.893387	-72.484044	252.30	12.00	264.30
7	41.893443	-72.483776	250.60	12.00	262.60
8	41.891542	-72.483314	250.19	12.00	262.19

Route Receptors

Name: Abbott Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.888523	-72.499219	272.64	4.00	276.64
2	41.892460	-72.499252	253.03	4.00	257.03
3	41.895535	-72.499327	255.23	4.00	259.23

Name: Middle Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.892485	-72.499118	253.53	4.00	257.53
2	41.895368	-72.481539	282.72	4.00	286.72
3	41.895587	-72.480981	280.15	4.00	284.15
4	41.896306	-72.479827	257.50	4.00	261.50
5	41.896554	-72.479511	253.20	4.00	257.20

Name: Pinney Street
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	41.897887	-72.479152	250.14	4.00	254.14
2	41.887345	-72.481834	234.65	4.00	238.65

Flight Path Receptors

Name: FP 1- Skylark
Description:
Threshold height: 50 ft
Direction: 88.2°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	41.928253	-72.582077	103.97	50.00	153.97
Two-mile	41.927370	-72.620966	34.25	673.15	707.40

Name: FP 2-Skylark 2
Description:
Threshold height: 50 ft
Direction: 267.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	41.928659	-72.570464	120.28	50.00	170.28
Two-mile	41.929789	-72.531586	156.50	567.22	723.71

Name: FP 3-Ellington
Description:
Threshold height: 50 ft
Direction: 176.8°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	41.927743	-72.457353	250.53	50.00	300.53
Two-mile	41.956610	-72.459545	302.64	551.32	853.96

Name: FP 4-Ellington 2
Description:
Threshold height: 50 ft
Direction: 353.6°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	41.922906	-72.456838	252.06	50.00	302.06
Two-mile	41.894170	-72.452535	457.02	398.47	855.49

Glare Analysis Results

Summary of Results No glare predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	0	0.0	0	0.0	12,210,000.0

Total annual glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Abbott Road	0	0.0	0	0.0
Middle Road	0	0.0	0	0.0
Pinney Street	0	0.0	0	0.0
FP 1- Skylark	0	0.0	0	0.0
FP 2-Skylark 2	0	0.0	0	0.0
FP 3-Ellington	0	0.0	0	0.0
FP 4-Ellington 2	0	0.0	0	0.0

PV: PV array 1 no glare found

Receptor results ordered by category of glare

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Abbott Road	0	0.0	0	0.0
Middle Road	0	0.0	0	0.0
Pinney Street	0	0.0	0	0.0
FP 1- Skylark	0	0.0	0	0.0
FP 2-Skylark 2	0	0.0	0	0.0
FP 3-Ellington	0	0.0	0	0.0
FP 4-Ellington 2	0	0.0	0	0.0

PV array 1 and Abbott Road

Receptor type: Route
No glare found

PV array 1 and Middle Road

Receptor type: Route
No glare found

PV array 1 and Pinney Street

Receptor type: Route

No glare found

PV array 1 and FP 1- Skylark

Receptor type: 2-mile Flight Path

No glare found

PV array 1 and FP 2-Skylark 2

Receptor type: 2-mile Flight Path

No glare found

PV array 1 and FP 3-Ellington

Receptor type: 2-mile Flight Path

No glare found

PV array 1 and FP 4-Ellington 2

Receptor type: 2-mile Flight Path

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians