ENVIRONMENTAL DESIGN PARTNERSHIP, LLP.
Shaping the physical environment

900 Route 146 Clifton Park, NY 12065
(P) 518.371.7621 edpllp.com

SOLAR FARM GLARE ANALYSIS REPORT FOR

WILSON HILL ROAD SOLAR ARRAY

TOWN OF HOOSICK
RENSSELAER COUNTY

PREPARED FOR: Nexamp

PREPARED BY: ENVIRONMENTAL DESIGN PARTNERSHIP, LLP

Prepared: February 23, 2024

Background and Methodology

A glare analysis was conducted utilizing ForgeSolar software which is based on Solar Glare Hazard Analysis Tool (SGHAT) software licensed from Sandia National Laboratories of Alburquerque, NM. The software satisfies the Federal Aviation Administration (FAA) glare analysis requirements for review of Solar Energy System Projects on Federally Obligated Airports (78 FR 63276).

The software provides the potential and intensity of glare at specific user selectable observation points or routes at locations surrounding the proposed solar array. The analysis is conducted considering the full cycle of potential glare over a full year using a 1-minute time step. If glare is anticipated a detailed output is provided including frequency duration and specific timing of glare during the year. The output includes both potential “green glare” (lower intensity and low potential for after image) and “yellow glare” (higher intensity with a potential for after image).

The user is able to input a series of parameters defining the proposed solar array and observations points and/or routes. A listing of the input parameters and specific information used for this project is provided herein.

Receptor Points

The ForgeSolar software allows a glare analysis to be performed at specific receptor points (horizontal and vertical positioning) or along a specific travel path (route). The glare analysis completed for the Wilson Hill Road Solar Array project included four (4) fixed observation points as discussed with the Planning Board as being potentially sensitive receptors for the project.

Observation Points (OP) 1 is in the vicinity of the school on Route 22 input with an observation point height above ground of 6 feet.

Observation Points (OP) 2 is in the vicinity of a farm on CR 95 input with an observation point height above ground of 6 feet

Observation Points (OP) 3 is in the vicinity of the intersection of Rogers Ave and Ashley Dr input with an observation point height above ground of 6 feet

Observation Points (OP) 4 is located midway down Ashley Dr input with an observation point height above ground of 6 feet

Obstructions

The observation points along Rogers Ave and Ashley Dr are obstructed by existing vegetation to the north and west which was input into the model as existing vegetation.

Glare Analysis Model Inputs

The following model parameters and corresponding site-specific data were input within the ForgeSolar software for this analysis:

Parameter	Unit	Value	Notes
Orientation	Degrees	180	East / West orientation
Tilt	Degrees	25	Fixed Tilt Orientation
Panel Surface Material		Smooth glass with anti-reflective coating	
PV System Height Above Ground	Feet	20 max	Height of panel
Height of Observation Points	Feet	6	Eye level
Height of Route Receptor	Feet	4.0	Eye level in a passenger vehicle
Route Receptor Field of View	Degrees	50	Field of view left and right along the route

Findings

The full results of the solar glare analysis for the proposed PV system are attached. The result is that no glare is predicted at any of observation points or routes over the course of the year.

ForgeSolar

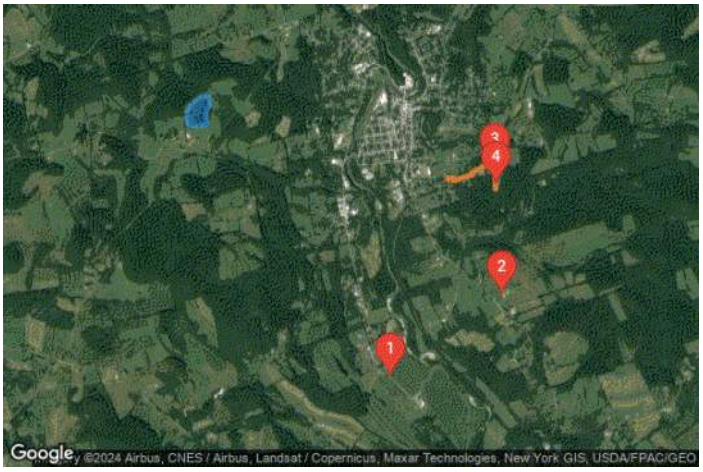
Wilson Hill

2024-2

Client: Nexamp

Created Feb 21, 2024
Updated Feb 23, 2024
Time-step 1 minute
Timezone offset UTC-5
Minimum sun altitude 0.0 deg
Site ID 112632.19431

Project type Advanced
Project status: active
Category 1 MW to 5 MW



Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
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: **Version 2**
Enhanced subtended angle calculation: **On**

Summary of Results No glare predicted!

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	25.0	180.0	0	0	11,540,000.0

Component Data

PV Array(s)

Total PV footprint area: 18.5 acres

Name: PV array 1
Footprint area: 18.5 acres
Axis tracking: Fixed (no rotation)
Tilt: 25.0 deg
Orientation: 180.0 deg

Rated power: 5000.0 kW
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	42.902453	-73.380540	910.68	20.00	930.68
2	42.902430	-73.381666	947.65	20.00	967.65
3	42.901542	-73.383340	1053.09	20.00	1073.09
4	42.901196	-73.383415	1050.74	20.00	1070.74
5	42.900693	-73.383909	1033.85	20.00	1053.85
6	42.899262	-73.383726	918.84	20.00	938.84
7	42.899231	-73.382117	894.98	20.00	914.98
8	42.899349	-73.380787	888.33	20.00	908.33
9	42.900661	-73.381012	936.72	20.00	956.72
10	42.901290	-73.380572	913.56	20.00	933.56
11	42.901817	-73.380465	907.41	20.00	927.41

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	ft	ft	ft
OP 1	42.872112	-73.353729	446.23	6.00	452.23
OP 2	42.881054	-73.337164	703.37	6.00	709.37
OP 3	42.894777	-73.338120	656.92	6.00	662.92
OP 4	42.892911	-73.338082	689.96	6.00	695.96

Obstruction Components

Name: Obstruction 1 - Ex Trees
Upper edge height: 35.0 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	42.895436	-73.337562	637.16
2	42.895110	-73.338570	637.61
3	42.894807	-73.340147	602.51
4	42.894576	-73.340577	601.52
5	42.894241	-73.341601	603.54
6	42.893974	-73.341601	596.85
7	42.893322	-73.344337	523.98
8	42.893628	-73.344450	534.71
9	42.893424	-73.345206	516.62
10	42.893605	-73.345249	517.81

Name: Obstruction 2 - Ex Trees
Upper edge height: 35.0 ft

Vertex	Latitude	Longitude	Ground elevation
	deg	deg	ft
1	42.892391	-73.338174	706.09
2	42.894277	-73.338191	670.48
3	42.892391	-73.338174	706.09

Summary of PV Glare Analysis

PV configuration and total predicted glare

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced	Data File
	deg	deg	min	min	kWh	
PV array 1	25.0	180.0	0	0	11,540,000.0	-

PV & Receptor Analysis Results

Results for each PV array and receptor

PV array 1 no glare found

Predicted energy output: 11,540,000.0 kWh (assuming sunny, clear skies)

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0

No glare found

Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not automatically account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and result may vary.
- 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.
- 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.
- 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.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. 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** for detailed assumptions and limitations not listed here.