ForgeSolar

Cefn Park Solar Farm

Cefn Park Solar Farm Road Receptors 20deg

Created Sept. 30, 2021
Updated Sept. 30, 2021
Time-step 1 minute
Timezone offset UTC0
Site ID 59382.10147

Project type Advanced
Project status: active
Category 10 MW to 100 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**

Analysis Methodologies:
- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

Summary of Results Glare with potential for temporary after-image predicted

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
Eastern Array	20.0	180.0	174	15,211	-
Western Array	20.0	180.0	53	14,892	-

Component Data

PV Array(s)

Total PV footprint area: 81,273 m^2

Name: Eastern Array
Axis tracking: Fixed (no rotation)
Tilt: 20.0 deg
Orientation: 180.0 deg
Footprint area: 38,050 m^2
Rated power: -
Panel material: Light textured glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 9.16 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	53.033283	-2.941465	36.31	3.10	39.41
2	53.033219	-2.943170	36.74	3.10	39.84
3	53.033116	-2.943600	36.31	3.10	39.41
4	53.032948	-2.943696	35.74	3.10	38.84
5	53.032800	-2.943621	35.23	3.10	38.33
6	53.032709	-2.943868	35.29	3.10	38.39
7	53.032496	-2.943814	34.59	3.10	37.69
8	53.032354	-2.943943	34.41	3.10	37.51
9	53.032012	-2.943771	34.08	3.10	37.18
10	53.031903	-2.943460	34.00	3.10	37.10
11	53.031735	-2.943364	34.00	3.10	37.10
12	53.031587	-2.943063	34.00	3.10	37.10
13	53.031232	-2.942945	34.00	3.10	37.10
14	53.031109	-2.942623	34.00	3.10	37.10
15	53.030935	-2.942570	34.00	3.10	37.10
16	53.030857	-2.942666	34.00	3.10	37.10
17	53.030612	-2.942666	34.00	3.10	37.10
18	53.030651	-2.942108	34.12	3.10	37.22
19	53.030916	-2.941507	34.77	3.10	37.87
20	53.031090	-2.941540	34.81	3.10	37.91
21	53.031167	-2.941851	34.47	3.10	37.57
22	53.031380	-2.941926	34.23	3.10	37.33
23	53.031548	-2.941786	34.15	3.10	37.25
24	53.031580	-2.940874	33.99	3.10	37.09
25	53.032516	-2.941175	35.51	3.10	38.61
26	53.032664	-2.941389	35.83	3.10	38.93
27	53.032767	-2.941400	35.88	3.10	38.98
28	53.032948	-2.941325	35.94	3.10	39.04

Name: Western Array
Axis tracking: Fixed (no rotation)
Tilt: 20.0 deg
Orientation: 180.0 deg
Footprint area: 43,223 m^2
Rated power: -
Panel material: Light textured glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 9.16 mrad

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	53.032147	-2.944742	34.67	3.10	37.77
2	53.032134	-2.945440	35.85	3.10	38.95
3	53.031992	-2.945987	37.02	3.10	40.12
4	53.031895	-2.946942	38.64	3.10	41.74
5	53.031631	-2.947231	38.32	3.10	41.42
6	53.031624	-2.947843	39.98	3.10	43.08
7	53.031495	-2.948583	41.57	3.10	44.67
8	53.031173	-2.948551	40.10	3.10	43.20
9	53.030424	-2.945654	34.91	3.10	38.01
10	53.030411	-2.944678	34.00	3.10	37.10
11	53.030637	-2.943648	34.00	3.10	37.10
12	53.030947	-2.943444	34.00	3.10	37.10
13	53.031541	-2.943895	34.00	3.10	37.10

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	m	m	m
OP 1	53.036308	-2.961107	62.59	1.50	64.09
OP 2	53.035605	-2.958565	62.60	1.50	64.10
OP 3	53.034502	-2.956172	58.42	1.50	59.92
OP 4	53.033599	-2.953318	51.64	1.50	53.14
OP 5	53.032586	-2.951140	48.33	1.50	49.83
OP 6	53.031231	-2.949145	42.64	1.50	44.14
OP 7	53.030205	-2.946731	35.58	1.50	37.08
OP 8	53.029760	-2.943813	34.81	1.50	36.31
OP 9	53.029611	-2.940991	34.03	1.50	35.53
OP 10	53.028863	-2.939027	34.03	1.50	35.53
OP 11	53.026845	-2.938427	34.09	1.50	35.59
OP 12	53.033716	-2.940111	36.96	1.50	38.46
OP 13	53.031994	-2.939424	35.09	1.50	36.59
OP 14	53.030342	-2.938555	33.03	1.50	34.53
OP 15	53.031697	-2.937247	37.00	1.50	38.50
OP 16	53.033374	-2.935916	39.56	1.50	41.06
OP 17	53.034374	-2.933685	36.68	1.50	38.18
OP 18	53.035651	-2.931410	34.80	1.50	36.30
OP 19	53.036974	-2.929586	32.79	1.50	34.29

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	
Eastern Array	20.0	180.0	174	15,211	-	-
Western Array	20.0	180.0	53	14,892	-	-

Distinct glare per month

Excludes overlapping glare from PV array for multiple receptors at matching time(s)

PV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
eastern-arra (green)	0	0	2	0	0	0	0	0	7	0	0	0
eastern-arra (yellow)	0	0	311	1019	1240	1221	1254	1165	609	1	0	0
western-arra (green)	0	0	1	1	0	0	0	0	1	0	0	0
western-arra (yellow)	0	0	440	1442	1778	1790	1822	1664	849	3	0	0

PV & Receptor Analysis Results

Results for each PV array and receptor

Eastern Array potential temporary after-image

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	115	145
OP: OP 5	50	1266
OP: OP 6	9	3833
OP: OP 7	0	2448
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	2838
OP: OP 14	0	2570
OP: OP 15	0	2111
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0

Eastern Array - OP Receptor (OP 1)

No glare found

Eastern Array - OP Receptor (OP 2)

No glare found

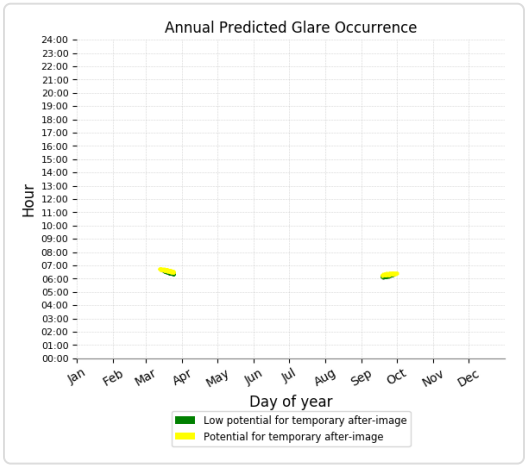
Eastern Array - OP Receptor (OP 3)

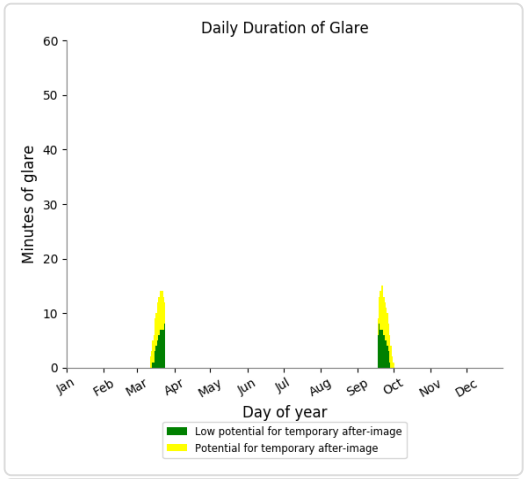
No glare found

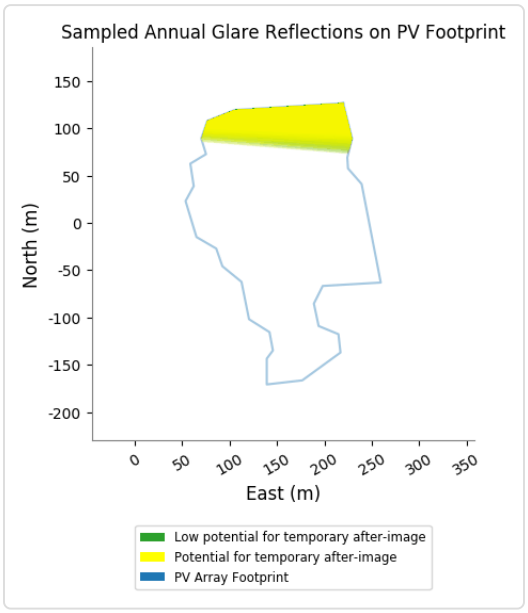
Eastern Array - OP Receptor (OP 4)

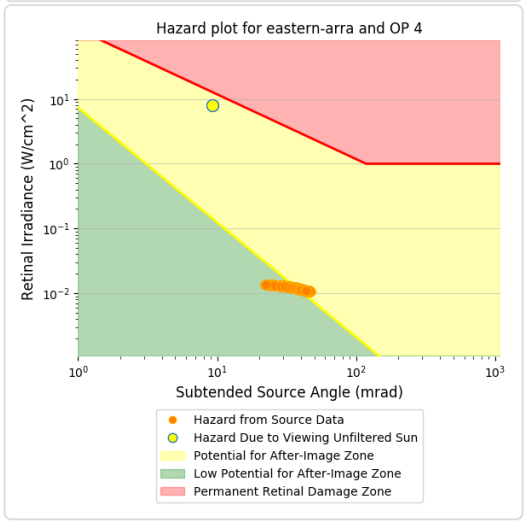
PV array is expected to produce the following glare for receptors at this location:

- 115 minutes of "green" glare with low potential to cause temporary after-image.
- 145 minutes of "yellow" glare with potential to cause temporary after-image.





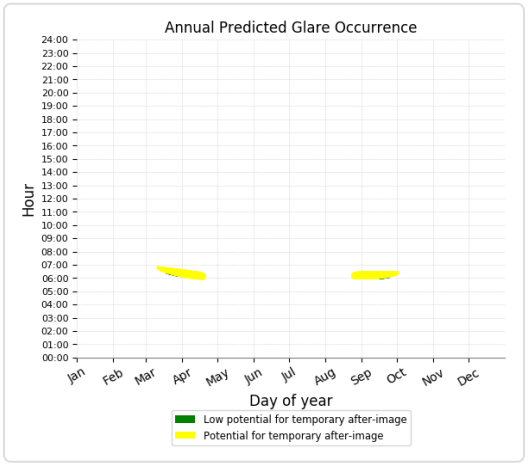


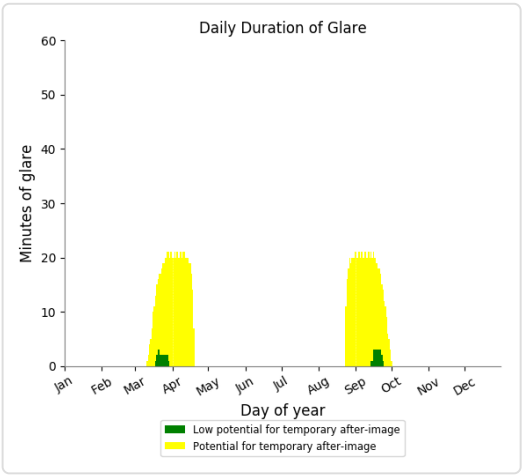


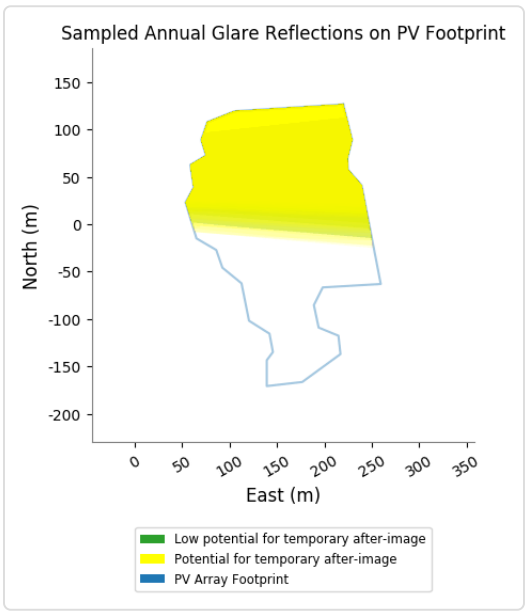
Eastern Array - OP Receptor (OP 5)

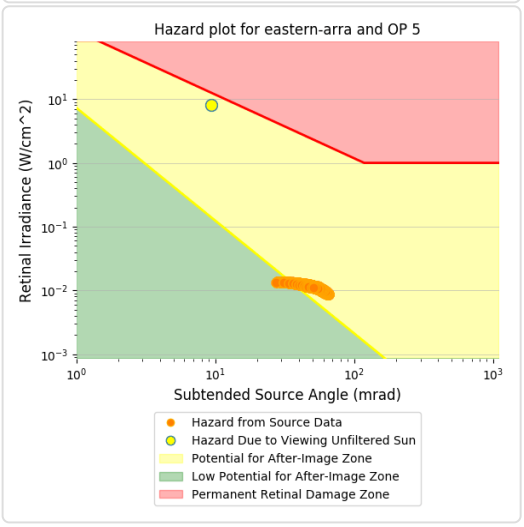
PV array is expected to produce the following glare for receptors at this location:

- 50 minutes of "green" glare with low potential to cause temporary after-image.
- 1,266 minutes of "yellow" glare with potential to cause temporary after-image.





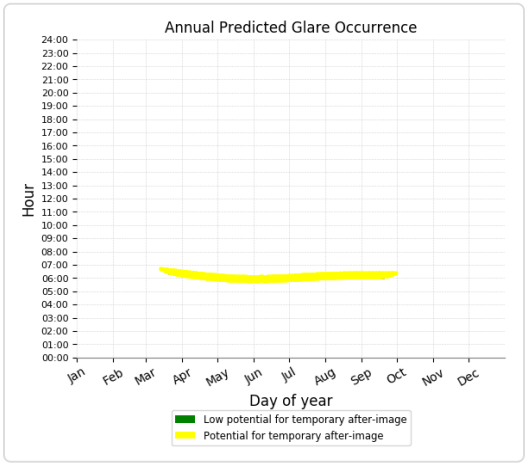


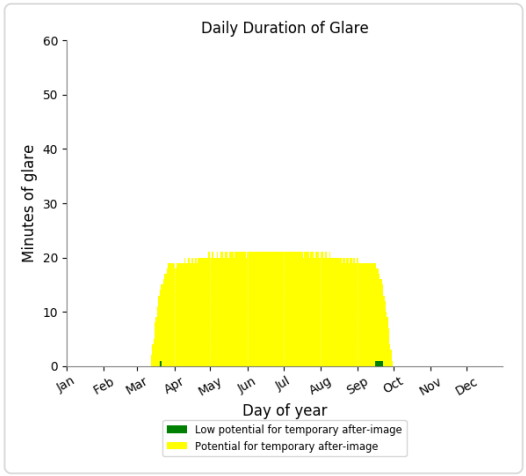


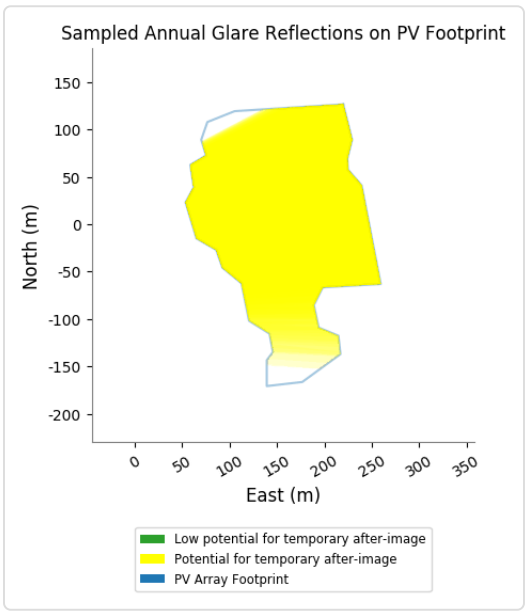
Eastern Array - OP Receptor (OP 6)

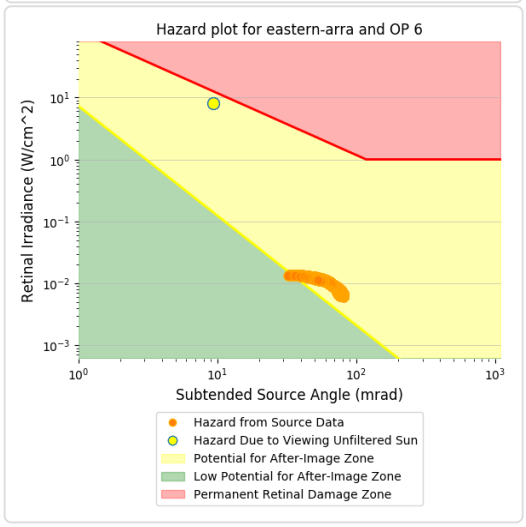
PV array is expected to produce the following glare for receptors at this location:

- 9 minutes of "green" glare with low potential to cause temporary after-image.
- 3,833 minutes of "yellow" glare with potential to cause temporary after-image.





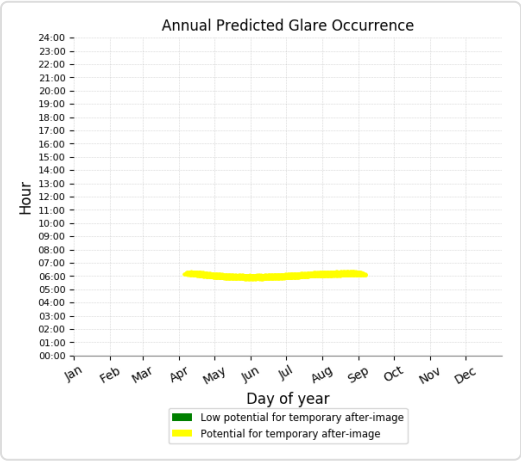


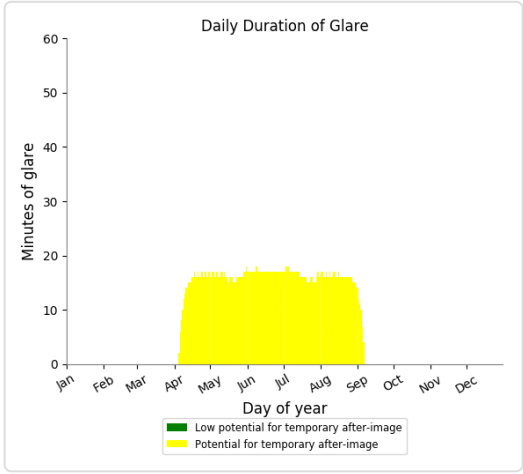


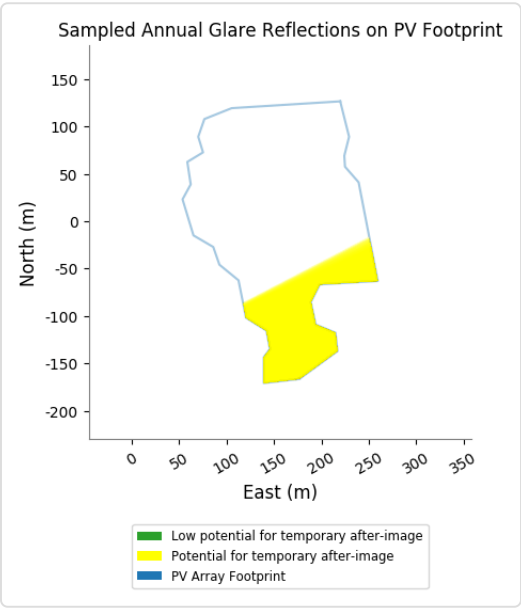
Eastern Array - OP Receptor (OP 7)

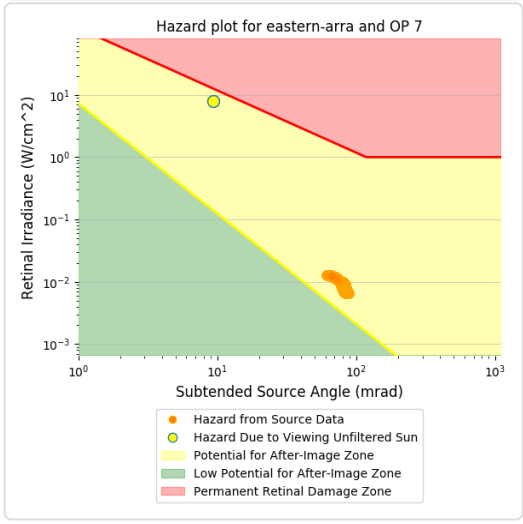
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,448 minutes of "yellow" glare with potential to cause temporary after-image.









Eastern Array - OP Receptor (OP 8)

No glare found

Eastern Array - OP Receptor (OP 9)

No glare found

Eastern Array - OP Receptor (OP 10)

No glare found

Eastern Array - OP Receptor (OP 11)

No glare found

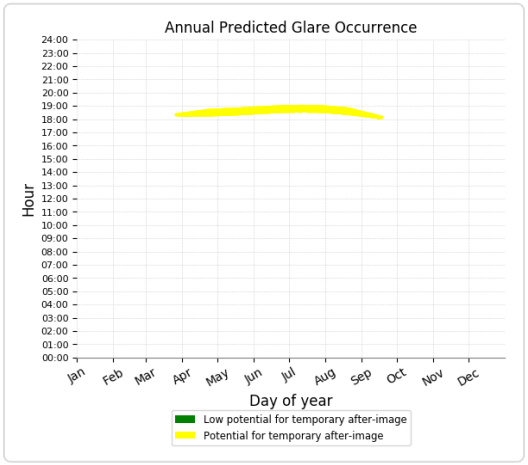
Eastern Array - OP Receptor (OP 12)

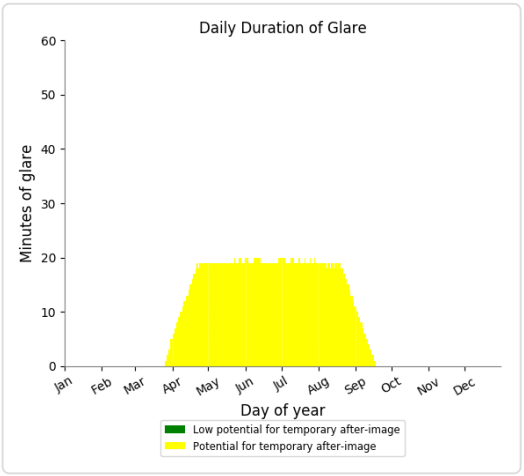
No glare found

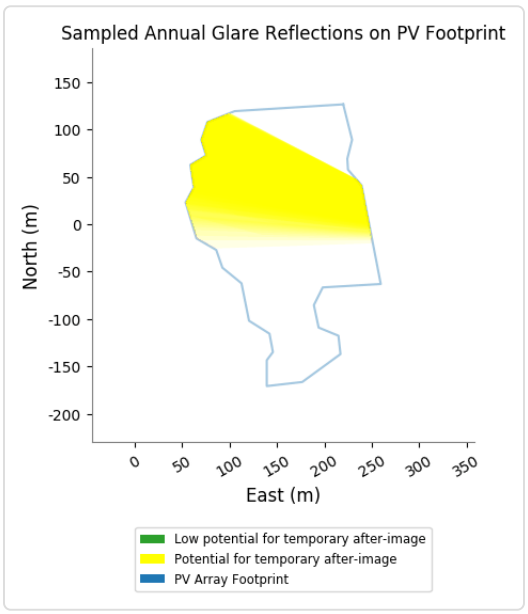
Eastern Array - OP Receptor (OP 13)

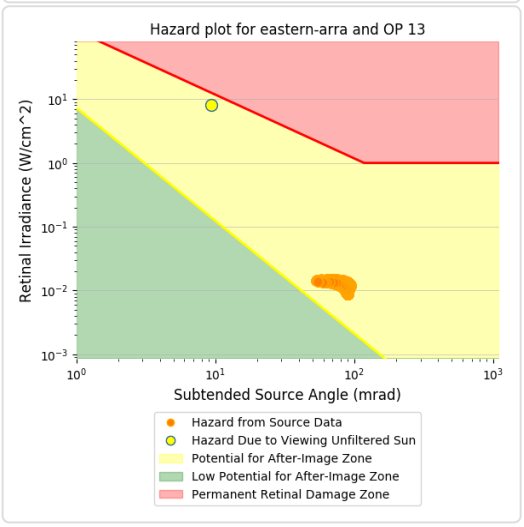
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,838 minutes of "yellow" glare with potential to cause temporary after-image.





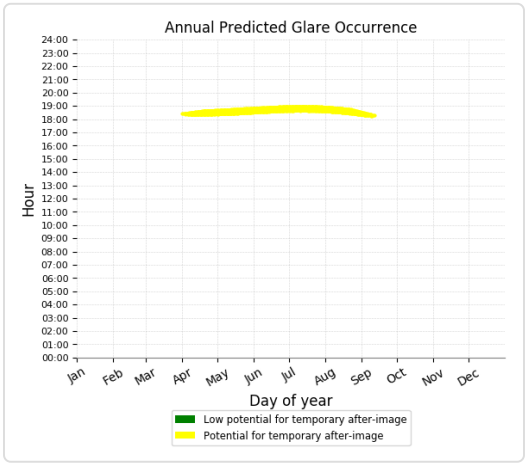


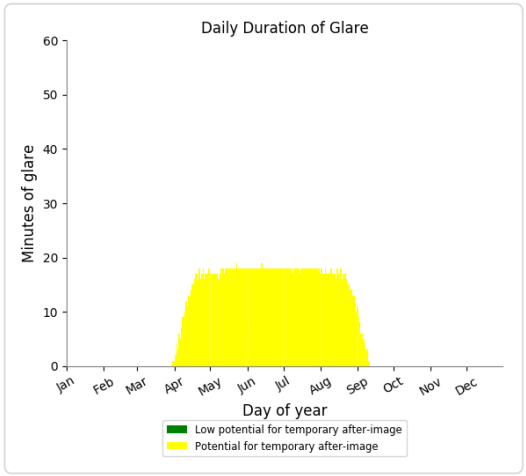


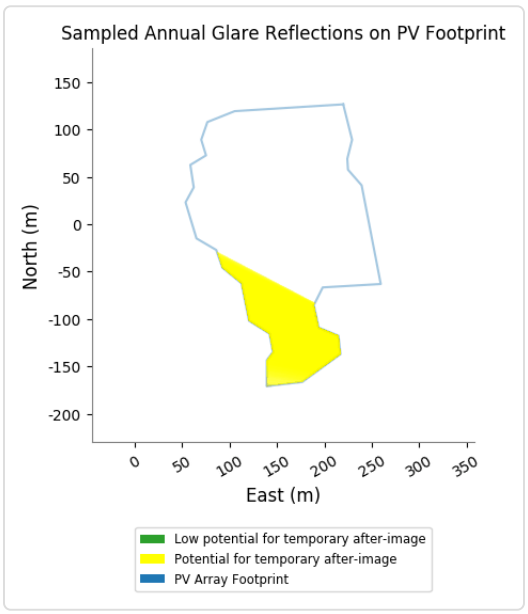
Eastern Array - OP Receptor (OP 14)

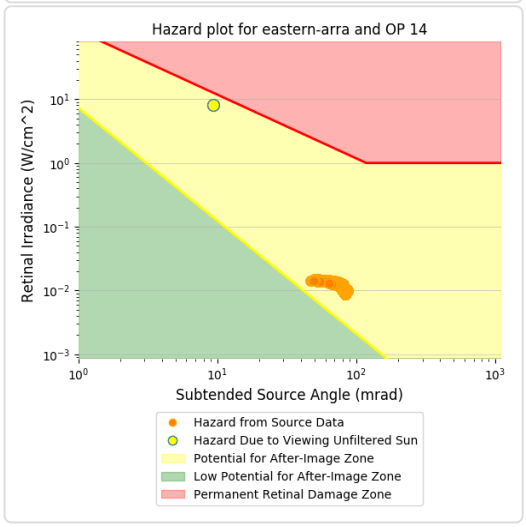
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,570 minutes of "yellow" glare with potential to cause temporary after-image.





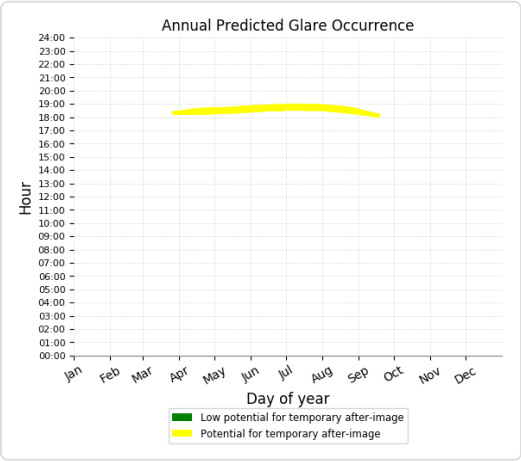


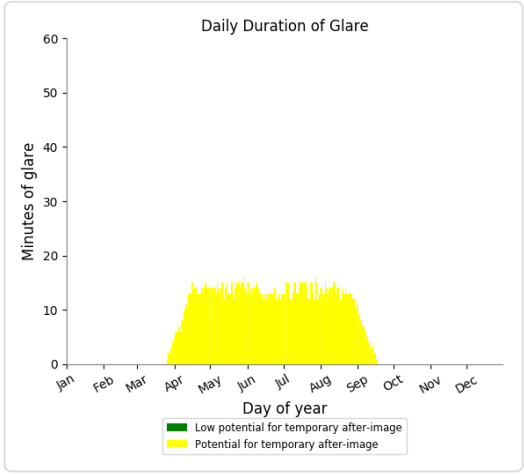


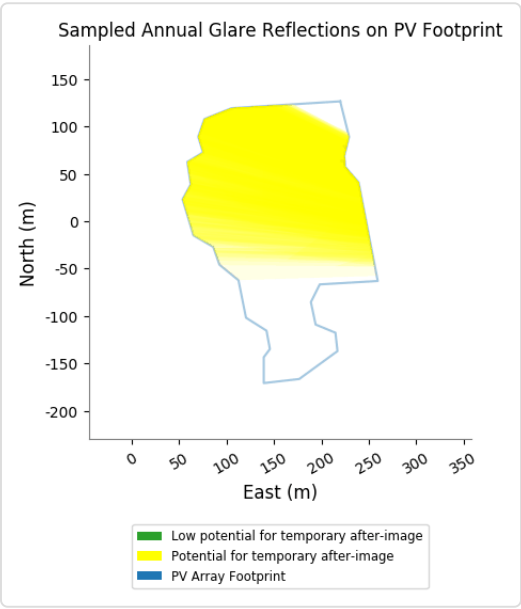
Eastern Array - OP Receptor (OP 15)

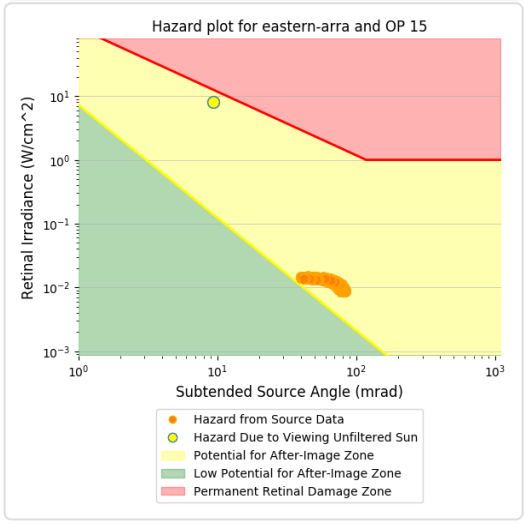
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,111 minutes of "yellow" glare with potential to cause temporary after-image.









Eastern Array - OP Receptor (OP 16)

No glare found

Eastern Array - OP Receptor (OP 17)

No glare found

Eastern Array - OP Receptor (OP 18)

No glare found

Eastern Array - OP Receptor (OP 19)

No glare found

Western Array potential temporary after-image

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
OP: OP 5	0	20
OP: OP 6	0	3016

OP: OP 7	0	3253
OP: OP 8	0	291
OP: OP 9	0	2143
OP: OP 10	0	1493
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	453
OP: OP 14	3	3376
OP: OP 15	50	847
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0

Western Array - OP Receptor (OP 1)

No glare found

Western Array - OP Receptor (OP 2)

No glare found

Western Array - OP Receptor (OP 3)

No glare found

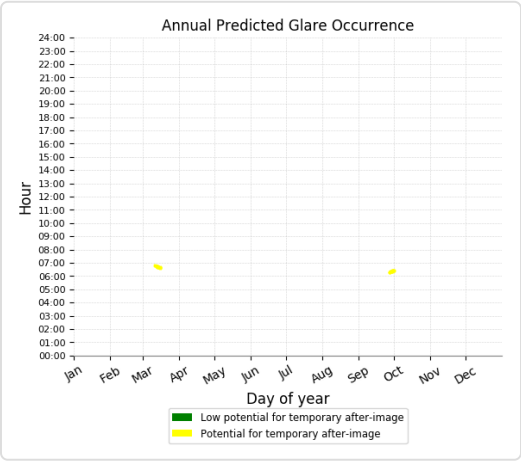
Western Array - OP Receptor (OP 4)

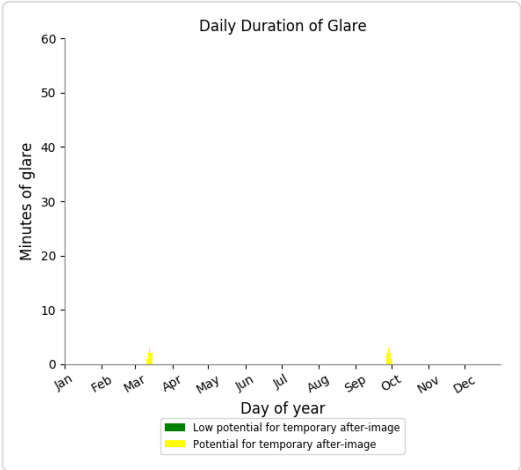
No glare found

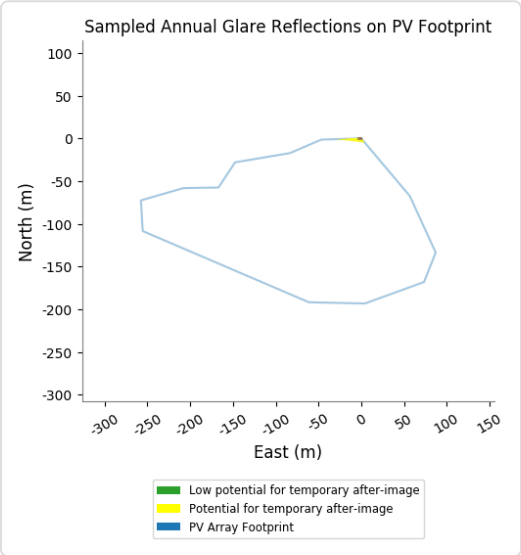
Western Array - OP Receptor (OP 5)

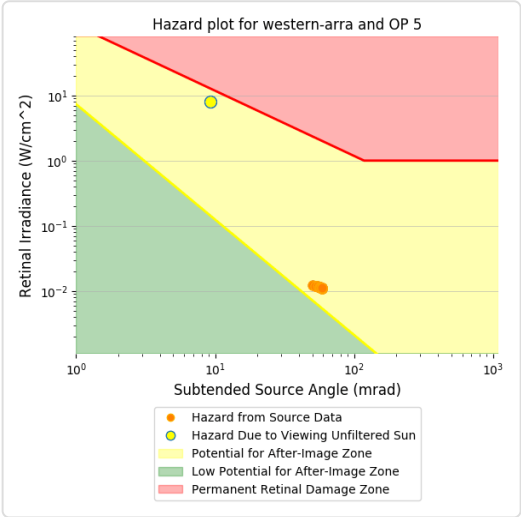
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 20 minutes of "yellow" glare with potential to cause temporary after-image.





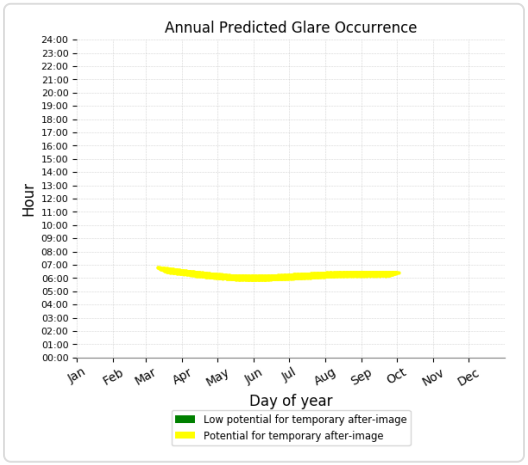


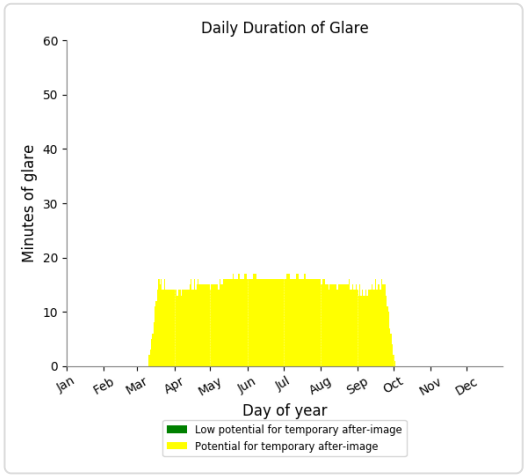


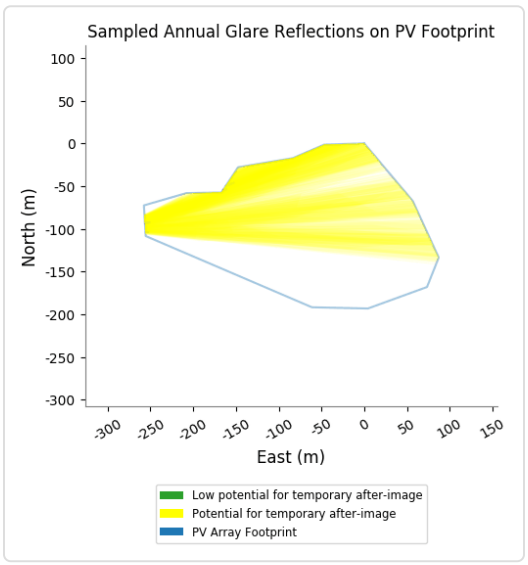
Western Array - OP Receptor (OP 6)

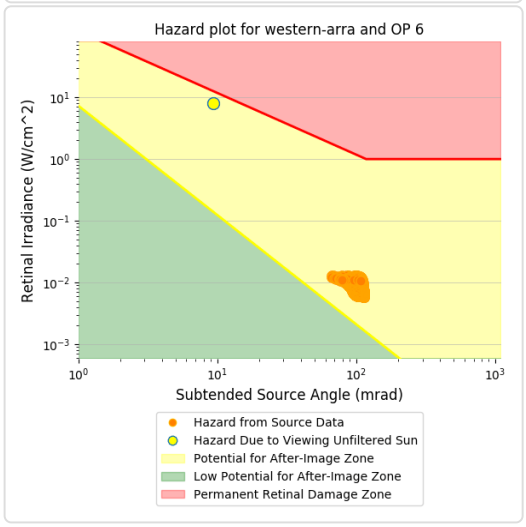
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,016 minutes of "yellow" glare with potential to cause temporary after-image.





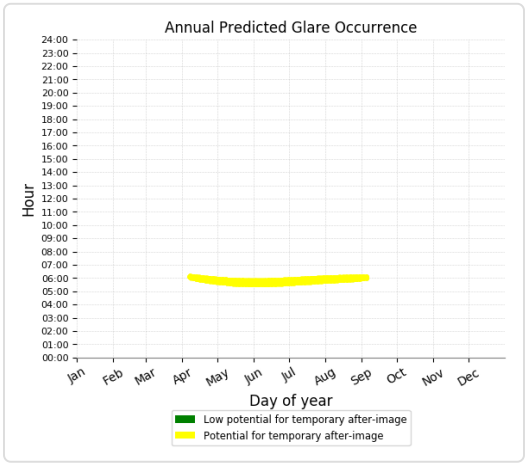


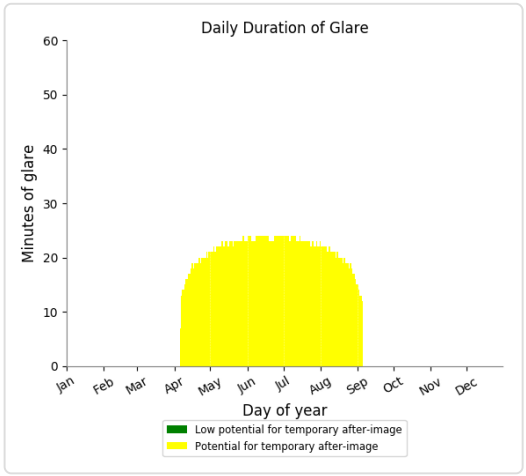


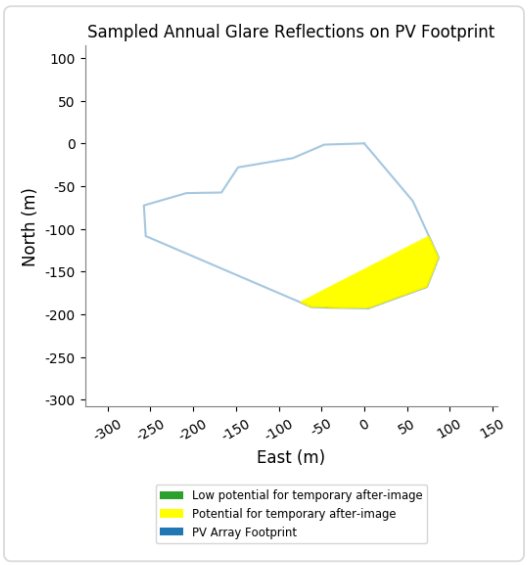
Western Array - OP Receptor (OP 7)

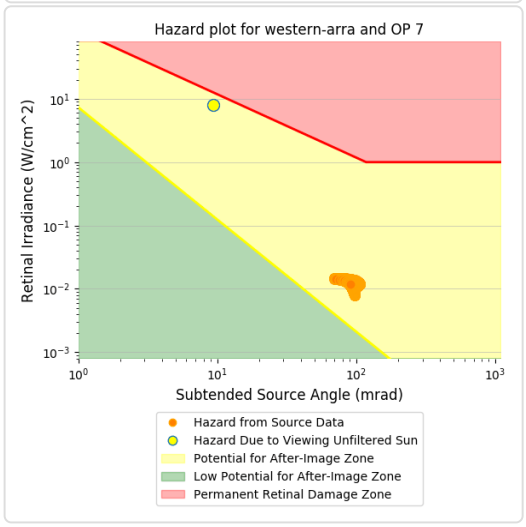
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 3,253 minutes of "yellow" glare with potential to cause temporary after-image.





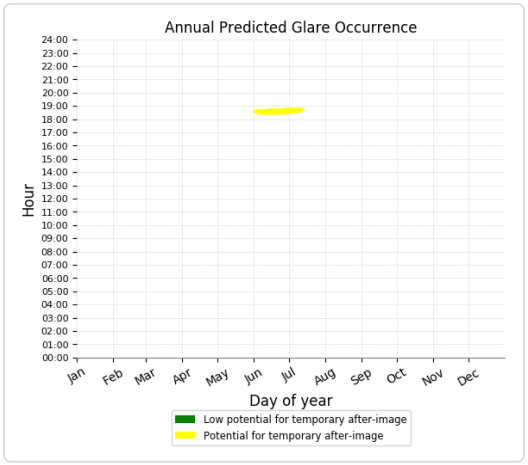


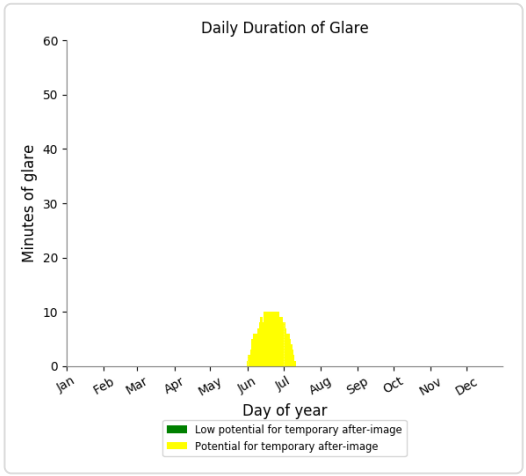


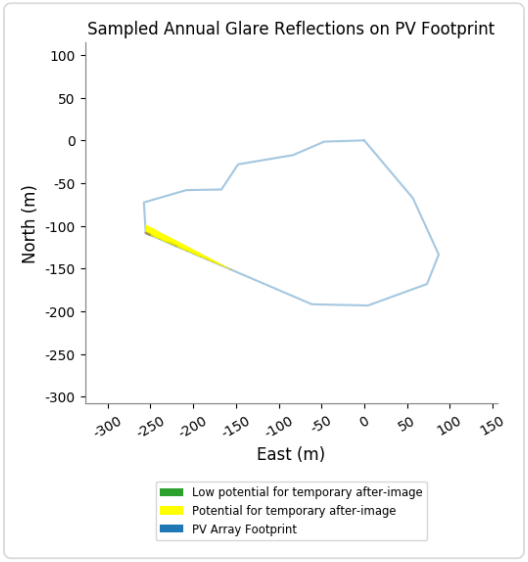
Western Array - OP Receptor (OP 8)

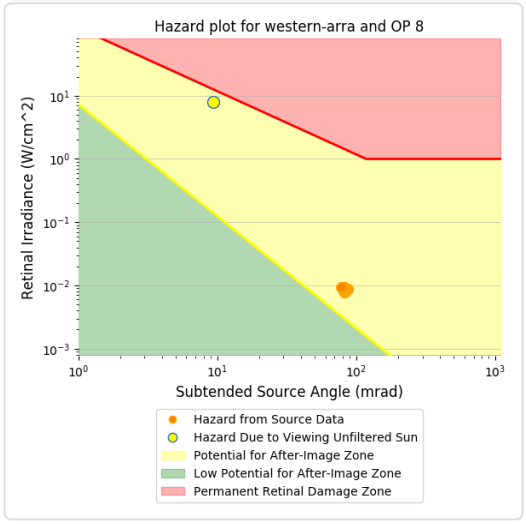
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 291 minutes of "yellow" glare with potential to cause temporary after-image.





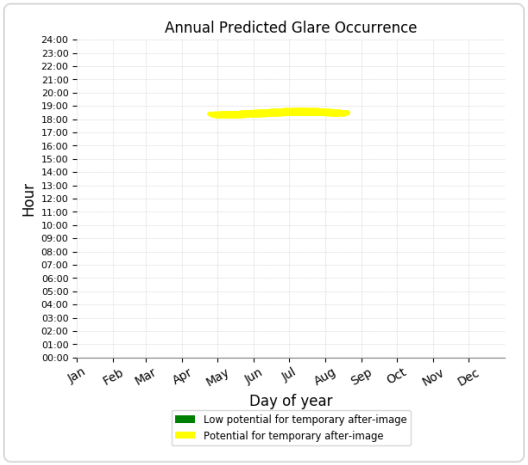


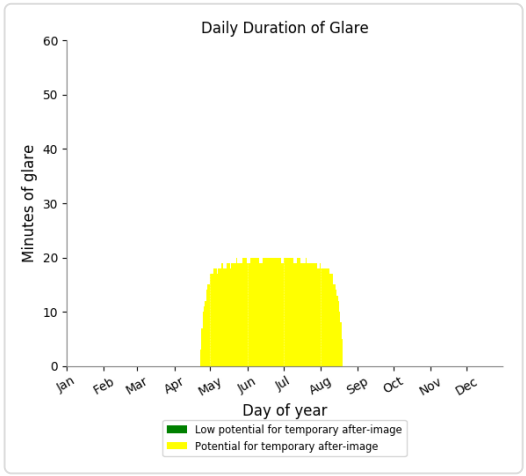


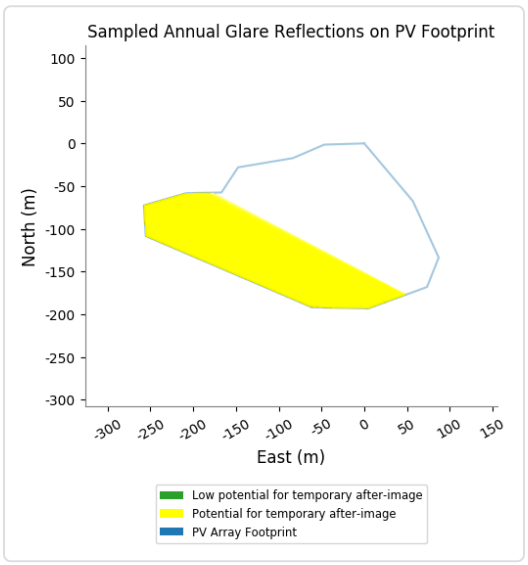
Western Array - OP Receptor (OP 9)

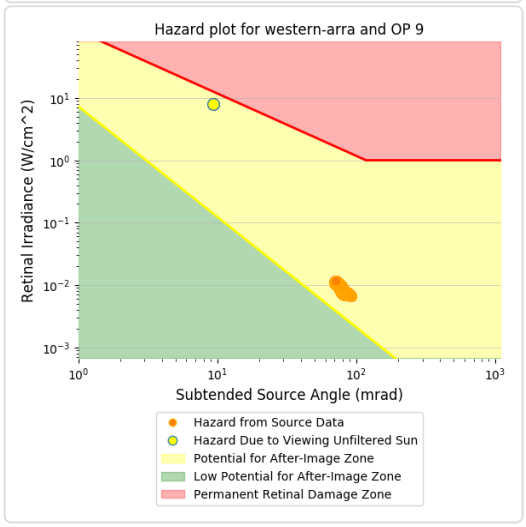
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 2,143 minutes of "yellow" glare with potential to cause temporary after-image.





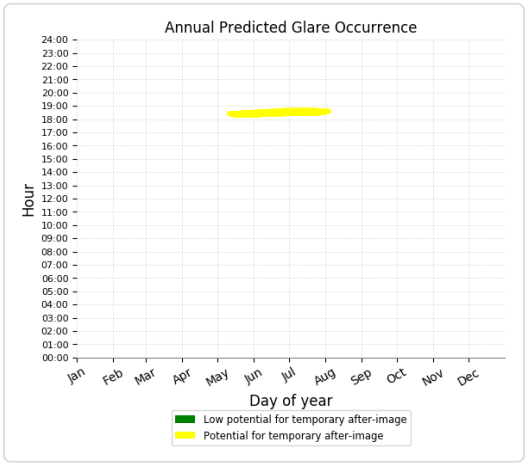


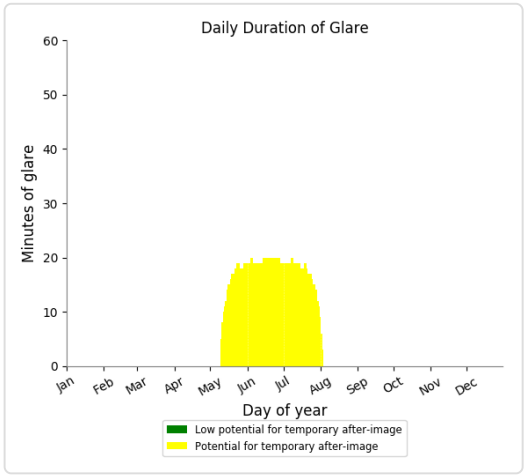


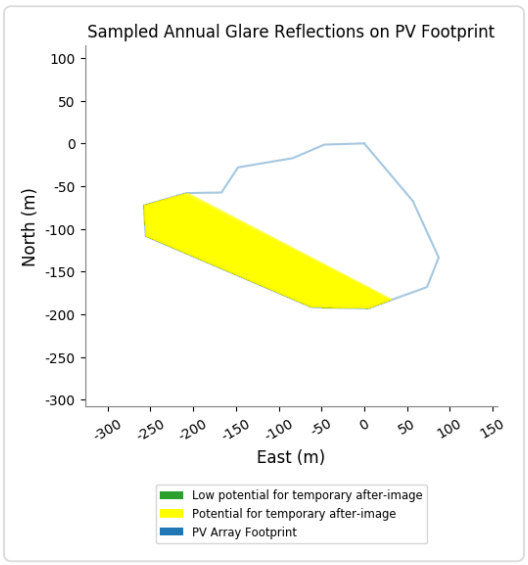
Western Array - OP Receptor (OP 10)

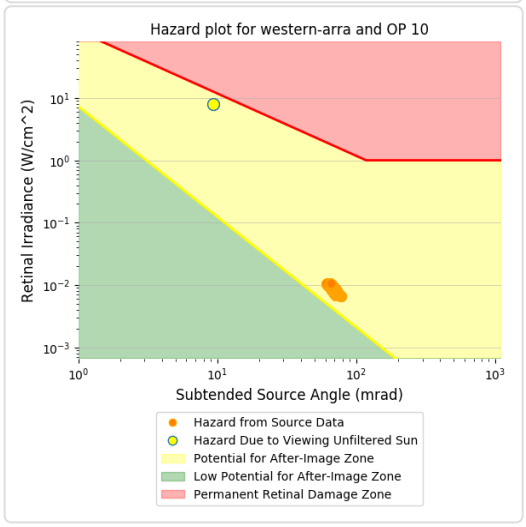
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 1,493 minutes of "yellow" glare with potential to cause temporary after-image.









Western Array - OP Receptor (OP 11)

No glare found

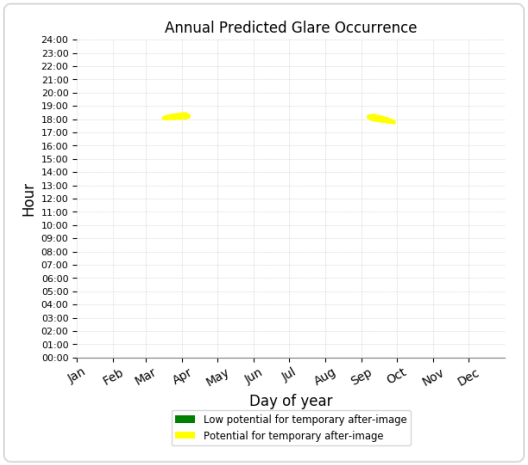
Western Array - OP Receptor (OP 12)

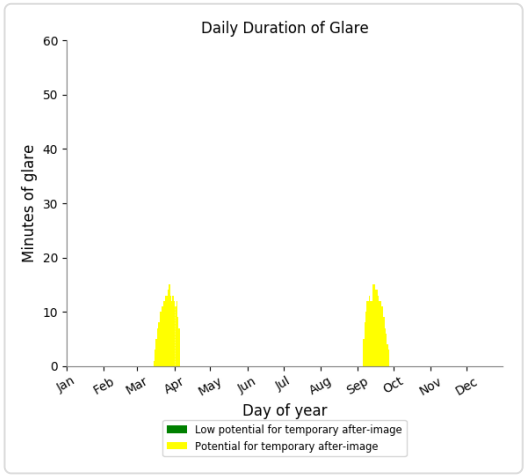
No glare found

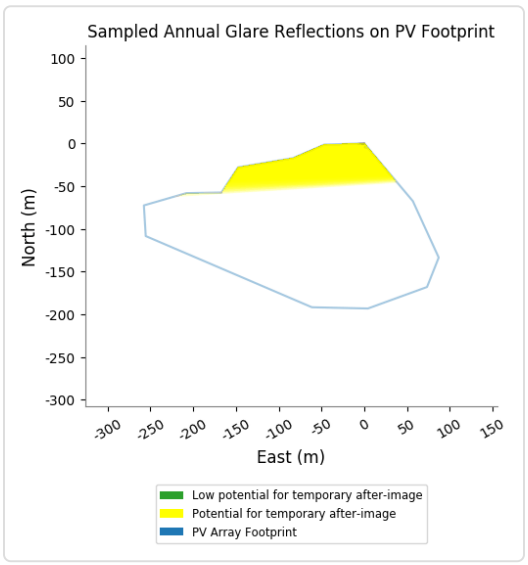
Western Array - OP Receptor (OP 13)

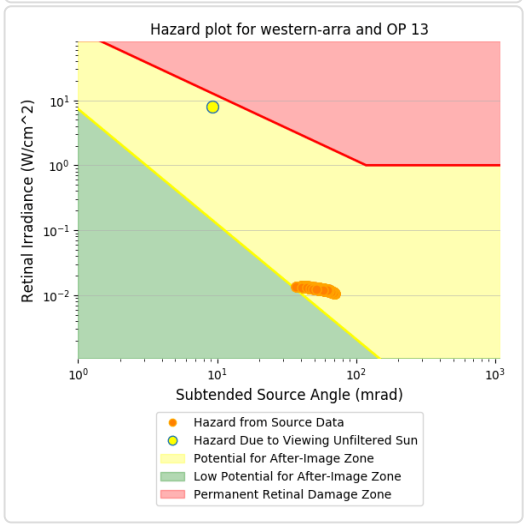
PV array is expected to produce the following glare for receptors at this location:

- 0 minutes of "green" glare with low potential to cause temporary after-image.
- 453 minutes of "yellow" glare with potential to cause temporary after-image.





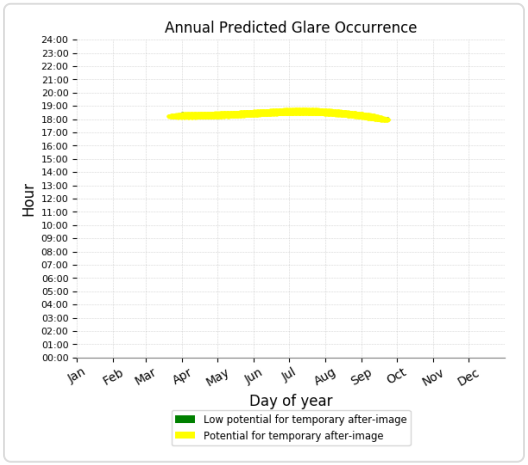


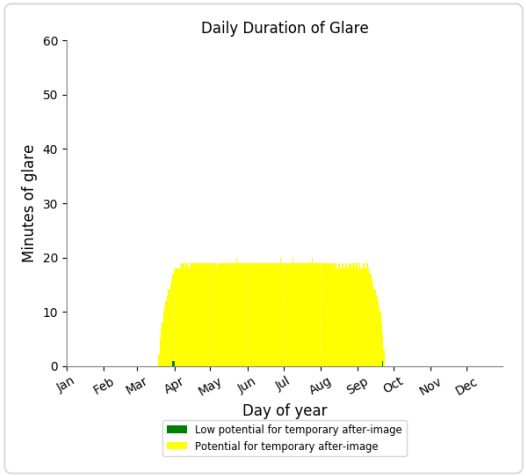


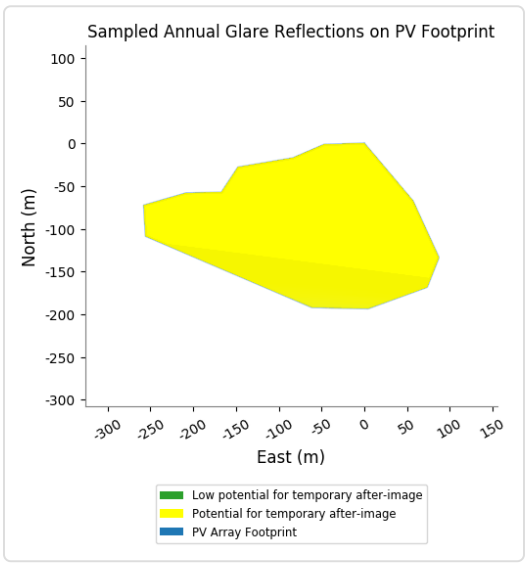
Western Array - OP Receptor (OP 14)

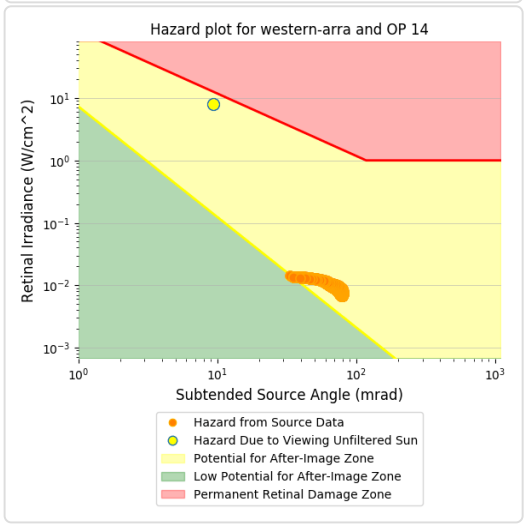
PV array is expected to produce the following glare for receptors at this location:

- 3 minutes of "green" glare with low potential to cause temporary after-image.
- 3,376 minutes of "yellow" glare with potential to cause temporary after-image.





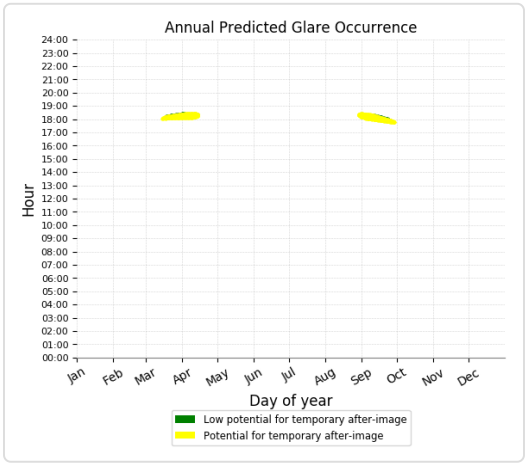


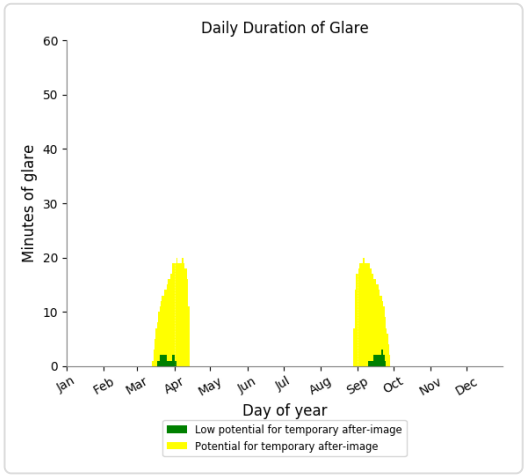


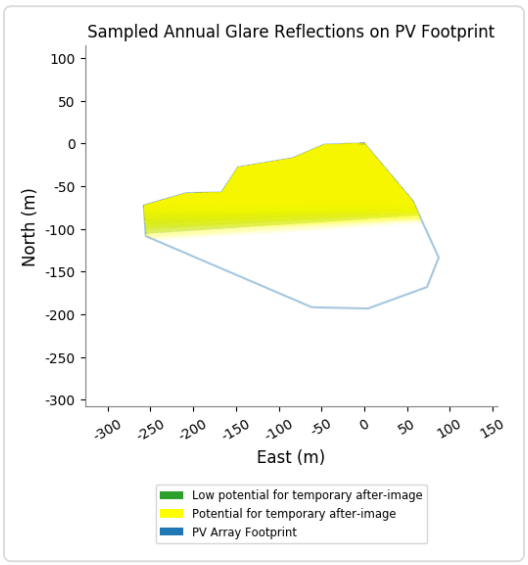
Western Array - OP Receptor (OP 15)

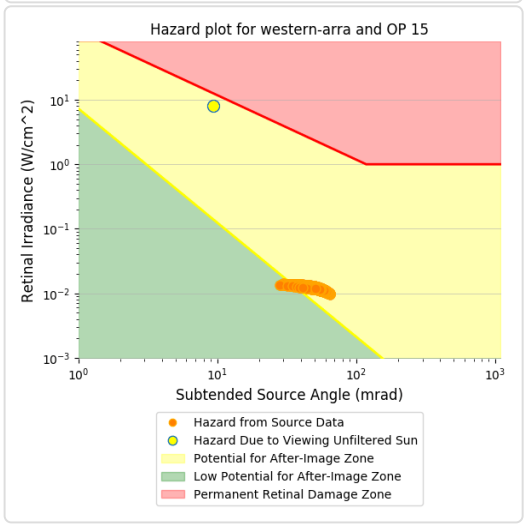
PV array is expected to produce the following glare for receptors at this location:

- 50 minutes of "green" glare with low potential to cause temporary after-image.
- 847 minutes of "yellow" glare with potential to cause temporary after-image.









Western Array - OP Receptor (OP 16)

No glare found

Western Array - OP Receptor (OP 17)

No glare found

Western Array - OP Receptor (OP 18)

No glare found

Western Array - OP Receptor (OP 19)

No glare found

Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not 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 results 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 fo 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.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.