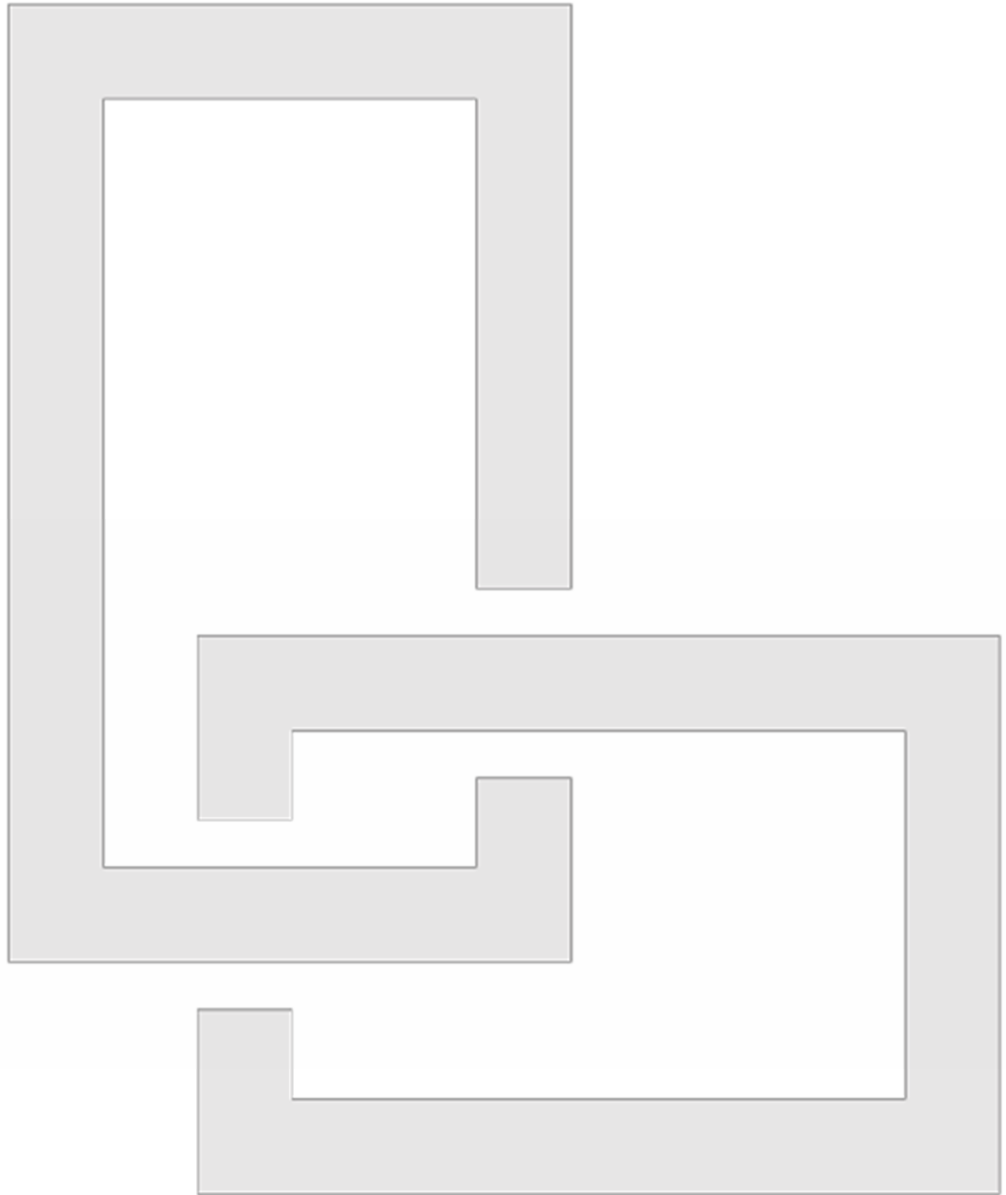


Prepared For:

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LaBella
Powered by partnership.

Abundant Solar Power, Inc. : Schwanger Road Solar
Glint-Glare Analysis Report
September 2026

SECTION 1: GENERAL CONSIDERATIONS CONCERNING GLARE FROM SOLAR PV FACILITIES

By definition, glare is the reflection of diffuse light sources like the sky, while glint is the reflection of directed light sources like the sun. Glint is far more intense than glare, and often what is referred to in the context of solar PV assessments. Despite these formal definitions, we will refer to the reflection of sunlight from the surface of solar panels as glare, given its common usage.

When light reflects from the surface of an object, the angle of incidence is always equal to the angle of reflection, as shown in the image to the right. In addition, as the angle of incidence increases so does the amount of light reflected. For solar panels, less than 5% of light from the sun reflects at angles common throughout the heart of the day, while between 15 and 40% of sun light reflects during the early morning and late afternoon hours due to the steeper sun angles.

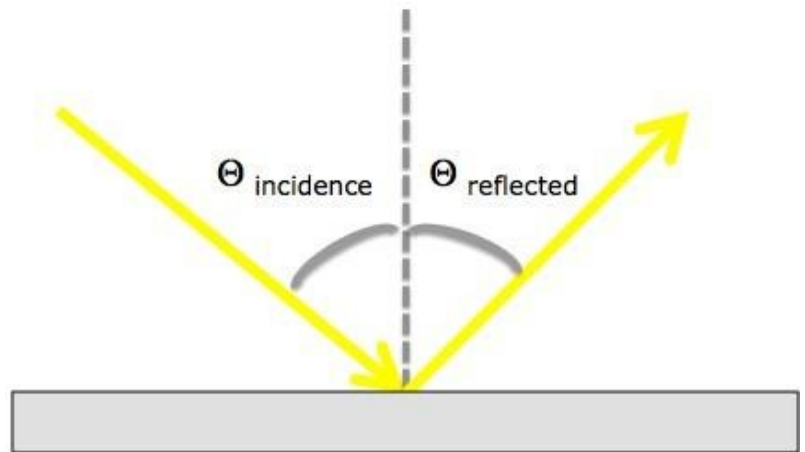


Figure 1 – Reflection Path

The tilt of the solar panels above the horizontal ground, their elevation above the ground, and the higher reflectivity of the panels at steeper solar angles means that the only times glare from these facilities could potentially impact observers close to the ground, like those in cars or in homes, would be when the sun is quite low in the eastern or western sky during dawn or dusk. Additionally, since the panels are oriented to the south, no locations to the north of the array could ever receive glare from the panels, regardless of the time of year.

While solar panels will reflect some light as described above, solar panel glass is designed to capture as much sunlight as possible and thus will generally have similar or less reflectivity than other materials. For example, the smooth surface of a pond will reflect roughly the same amount of sunlight as a solar panel at the angles of interest here, while a freshly covered field of snow will reflect more than twice as much light on average and a steel surface would reflect more than four times as much light over these same angles. Thus, glare from solar facilities is not generally found to be a concern when compared to other materials common in natural and built environments. This can be seen, for example, in the fact that several solar facilities have been built near airports with findings from the Federal Aviation Administration (FAA) that glare from them poses no hazard to air navigation.

SECTION 2: GLARE EVALUATION APPROACH

To ensure there is no glare set by the solar array the FAA developed Technical Guidance for Evaluating Selected Solar Technologies on Airports in 2010 (FAA Guidance). The FAA Guidance recommends use of the Solar Glare Hazard Analysis Tool (SGHAT) by Forge Solar to determine any potential glare impacts a result of the construction of a solar array. Given this, LaBella assessed the site based on the topography of the area and the natural and proposed vegetative screening around the Project site using the tool outlined above. The solar panel surfaces are modeled to an average of about 8.5 feet above the natural ground on the project site. The project site generally slopes from east to west, with a max elevation of 458 feet MSL to the elevation of 404 feet MSL, with a total elevation change of roughly 50 feet. This results in the average panel surface elevation slightly above the ground surface at the project location at 1311 Schwanger Road, Mount Joy, PA 17552.

The SGHAT that was used in this assessment was adopted by the FAA in October 2013 for use in assessing solar systems located on or near airports and can predict both the size and intensity of glare for every minute of every day of the year. Of particular importance when using these projections is to note that the Forge Solar tool is designed to be conservative with three assumptions acting to substantively overestimate the potential for near surface glare. First, the tool models the solar facility as large unbroken sheets of glass despite the fact that roughly 40 to 50% of the facility's area is undisturbed ground between the rows of panels. Second, the tool takes no credit for any manmade obstructions such as buildings, fences, etc. And third, it makes no detailed accounting of cloud cover which could hide the sun and prevent direct solar reflections entirely on some days. The details of this analysis for the present system are included below.



Figure 2.0 – Site Configuration of Northern Side



Figure 2.1 – Site Configuration of Southern Side

The SGHAT analysis was performed for the observation points at some of the residences and buildings adjacent to the site and included a route analysis for the roads on the north, south, east, and west sides of the site.

The following tables summarize the potential annual minutes of glare at each of the observation points shown on the map above. For the purposes of this report Green Glare is defined as glare with a low potential to cause flash blindness. Yellow Glare is defined as glare with the potential to cause temporary flash blindness. Red Glare is defined as glare with potential to cause permanent retinal damage.

The SGHAT analysis was performed including the proposed screening trees to the east and south of the system. Observation Point heights for this analysis were measured at seven and a half (7.0) feet to represent observation from the first-floor of a residence/building, and fifteen (15) feet to represent observation from the second-floor level.

The results shown below are from the performed analysis, the 6-foot height of proposed screening trees was chosen in order to be more conservative when modeling the system, and to generate potential impacts that will occur at the time of tree-planting.

Receptor/Route	Annual Green Glare		Annual Yellow Glare		Red Glare	
	min.	hr.	min.	hr.	min.	hr.
Cloverleaf Road (S.R. 4025)	5,156	85.9	1,698	28.3	0	0.0
Knoll Drive	4,676	77.9	1,144	19.1	0	0.0
Rob Drive	165	2.8	332	5.5	0	0.0
Schwanger Road	4,047	67.5	341	5.7	0	0.0
S.R. 283 North	6,102	101.7	2,580	43.0	0	0.0
S.R. 283 South	6,135	102.2	4,909	81.8	0	0.0
S.R. 283 South On-Ramp	4,028	67.1	2,717	45.3	0	0.0
OP #1	0	0.0	0	0.0	0	0.0
OP #2	177	3.0	0	0.0	0	0.0
OP #3	665	11.1	0	0.0	0	0.0
OP #4	1,258	21.0	0	0.0	0	0.0
OP #5	1,886	31.4	39	0.7	0	0.0
OP #6	1,935	32.2	0	0.0	0	0.0
OP #7	2,489	41.5	234	3.9	0	0.0
OP #8	3,011	50.2	612	10.2	0	0.0
OP #9	4,100	68.3	1,012	16.9	0	0.0
OP #10	0	0.0	0	0.0	0	0.0
OP #11	0	0.0	0	0.0	0	0.0
OP #12	0	0.0	0	0.0	0	0.0
OP #13	1,368	22.8	421	7.0	0	0.0
OP #14	0	0.0	0	0.0	0	0.0
OP #15	1,569	26.1	1,415	23.6	0	0.0
OP #16	0	0.0	0	0.0	0	0.0
OP #17	1,692	28.2	491	8.2	0	0.0
OP #18	0	0.0	0	0.0	0	0.0
OP #19	0	0.0	0	0.0	0	0.0
OP #20	0	0.0	0	0.0	0	0.0
OP #21	0	0.0	0	0.0	0	0.0
OP #22	0	0.0	0	0.0	0	0.0
OP #23	0	0.0	0	0.0	0	0.0
OP #24	0	0.0	0	0.0	0	0.0
OP #25	0	0.0	0	0.0	0	0.0
OP #26	0	0.0	0	0.0	0	0.0
OP #27	0	0.0	0	0.0	0	0.0
OP #28	0	0.0	0	0.0	0	0.0
OP #29	0	0.0	0	0.0	0	0.0
OP #30	0	0.0	0	0.0	0	0.0
OP #31	0	0.0	0	0.0	0	0.0
OP #32	0	0.0	0	0.0	0	0.0
OP #33	0	0.0	0	0.0	0	0.0
OP #34	0	0.0	0	0.0	0	0.0
OP #35	0	0.0	0	0.0	0	0.0
OP #36	0	0.0	0	0.0	0	0.0
OP #37	0	0.0	0	0.0	0	0.0
OP #38	0	0.0	0	0.0	0	0.0
OP #39	0	0.0	0	0.0	0	0.0
OP #40	723	12.1	0	0.0	0	0.0
OP #41	457	7.6	0	0.0	0	0.0
OP #42	3,427	57.1	1,161	19.4	0	0.0
OP #43	3,944	65.7	1,289	21.5	0	0.0

OP #44	2,095	34.9	0	0.0	0	0.0
OP #45	4,006	66.8	96	1.6	0	0.0
OP #46	732	12.2	0	0.0	0	0.0
OP #47	0	0.0	0	0.0	0	0.0
OP #48	0	0.0	0	0.0	0	0.0
OP #49	0	0.0	0	0.0	0	0.0
OP #50	0	0.0	0	0.0	0	0.0
OP #51	0	0.0	0	0.0	0	0.0
OP #52	0	0.0	0	0.0	0	0.0
OP #53	0	0.0	0	0.0	0	0.0
OP #54	0	0.0	0	0.0	0	0.0
OP #55	0	0.0	0	0.0	0	0.0

Figure 3.0 – Glare Summary

Fifty-five (55) observation points were reviewed during the analysis. Each observation point was modeled at either seven (7) feet or fifteen (15) feet, depending on if the structure(s) have multiple stories.

As noted above, the SGHAT does not fully consider existing vegetation between the observation points and the array. The impact of the potential glare is not known fully at this time; further investigation would be required in order to conclude if the green glare and yellow glare impacts can be reduced even further or eliminated entirely.

Analysis Results

Of the routes that were analyzed, all of them have the potential for green and yellow glare. The route receptors were modeled at car height, approximately four and a half (4.5) feet. Cloverleaf Road, Knoll Drive, Rob Drive, Schwanger Road, S.R. 283 North, S.R. 283 South, and the S.R. 283 South On-Ramp all have the potential for green and yellow glare.

Eighteen (18) of the fifty-five (55) Observation Points (OPs) that were modeled in the analysis will have the potential for green glare and/or yellow glare, the remaining OPs will not see glare of any type.

OP #2 and OP #3 represent the first and second stories of a residence along the western side of Cloverleaf Road. OP #2 has the potential for 177 minutes (3.0 hours) of green glare annually. OP #3 has the potential for 665 (11.1 hours) of green glare annually. Neither of these OPs have the potential for yellow glare.

OP #4 and OP #5 represent the two stories of a residence located along the western side of Cloverleaf Road. OP #4 has the potential for 1,258 minutes (21.0 hours) of green glare annually, and OP #5 has the potential for 1,886 minutes (31.4 hours) of green glare annually. Neither of these OPs have the potential for yellow glare.

OP #6 and OP #7 represent the two stories of a second residence located along the western side of Cloverleaf Road. OP #6 has the potential for 1,935 minutes (32.2 hours) of green glare annually and no potential for yellow glare. OP #7 has the potential for 2,489 minutes (41.5 hours) of green glare and 234 minutes (3.9 hours) of yellow glare annually.

OP #8 and OP #9 represent the two stories of a third residence along the western side of Cloverleaf Road. Both points have the potential for green and yellow glare.

OP #8 has the potential for 3,011 minutes (50.2 hours) of green glare, and 612 minutes (10.2 hours) of yellow glare annually. OP #9 has the potential for 4,100 minutes (68.3 hours) of green glare, and 1,012 minutes (16.9 hours) of yellow glare annually.

OP #13 represents the second story of a row of townhomes located along Knoll Drive. This OP has the potential for 1,368 minutes (22.8 hours) of green glare annually, and 421 minutes (7.0 hours) of yellow glare annually.

OP #15 represents the second story of a residence located along the northeastern side of Rob Drive. This OP has the potential for 1,569 minutes (26.1 hours) of green glare, and 1,415 minutes (23.6 hours) of yellow glare annually.

OP #17 represents the second story of another residence along the northeastern side of Rob Drive. This location has the potential for 1,692 minutes (28.2 hours) of green glare, and 491 minutes (8.2 hours) of yellow glare annually.

OP #40 and OP #41 represent each of the two stories of a residence located on the southern side of Schwanger Road. This OP #40 will have the potential for 723 minutes (12.1 hours) of green glare annually. OP #41 will have the potential for 457 minutes (7.6 hours) of green glare annually. There is no potential for any yellow glare at these OPs.

OP #42 and OP#43 represent the first and second stories of Rheems Menonite Church located along Schwanger Road. OP #42 (representing the first story) will have the potential for both green and yellow glare. The green glare will have the potential to occur annually for 3,427 minutes (57.1 hours) and the yellow glare for 1,161 minutes (19.4 hours). Op #43 (representing the second story) will also have the potential for both green and yellow glare. The green glare will have the potential to occur annually for 3,944 minutes (65.7 hours) and the yellow glare for 1,289 minutes (21.5 hours).

OP #44 and OP #45 represent the first and second stories of a farm building located along the southern side of Schwanger Road. These OPs have the potential for annual green and yellow glare. For OP #44, the annual potential for green glare will be 2,095 minutes (34.9 hours). For OP #45, the potential for green glare will be 4,006 minutes (66.8 hours) annually, and the potential for yellow glare will be 96 minutes (1.6 hours) annually.

OP #46 represents the Greiner Industries building on the eastern side of S.R. 283 (located along Steel Way). This location has the potential for 732 minutes (12.2 hours) of green glare annually. There is no potential for yellow glare at this OP.

Each of the seven (7) route receptors that were modeled will have the potential for green and yellow glare annually. Cloverleaf Road will have the potential for 5,156 minutes (85.9 hours) of green glare and 1,698 minutes (28.3 hours) of yellow glare annually. Knoll Drive will have the potential for 4,676 minutes (77.9 hours) of green glare and 1,144 minutes (19.1 hours) of yellow glare annually. Rob Drive will have the potential for 165 minutes (2.8 hours) of green glare and 332 minutes (5.5 hours) of yellow glare annually. S.R. 283 North will have the potential for 6,102 minutes (101.7 hours) of green glare and 2,580 minutes (43.0 hours) of yellow glare annually. S.R. 283 South will have 6,135 minutes (102.2 hours) of green glare and 4,909 minutes (81.8 hours) of yellow glare annually. The on-ramp to S.R. 283 South will also have the potential for both green and yellow glare, with 4,028 minutes (67.1 hours) of potential green glare annually and 2,717 minutes (45.3 hours) of potential yellow glare annually. Finally, Schwanger Road will have the potential for green glare which will occur for 4,047 minutes (67.5 hours) annually, and yellow glare that will occur for 341 minutes (5.7 hours) annually.

The glare present at these OPs and route receptors will only occur during sunrise or sunset for a portion of the year. The timeframe that will see glare will occur from early March to early October and will last for no longer than 45 minutes each day.

SECTION 3: MITIGATION REDUCING THE POTENTIAL FOR GLARE FROM PROPOSED SOLAR PV FACILITY

Given the conservative nature of the above analysis, there are several features that will act to further minimize any potential impacts from glare at this site. First, the panels to be used at this site are manufactured with specialized glass with an anti-reflection coating that substantively reduces their potential to create glare. Next, many of these locations and roads are screened from the solar facility by existing forested vegetation running along two (2) sides of the project site. The project is also proposing the addition of screening trees with a minimum height of six (6) feet. As the trees increase in height over time, it can be anticipated that the potential for glare will decrease further from what is shown in the provided SGHAT Glare Analysis. The analysis utilizes a tree height of six (6) feet for the screening trees to model site conditions at the time of tree planting.

SECTION 4: CONCLUSION

Given the above analysis, eighteen (18) of the fifty-five (55) selected observation points may see some green and yellow glare from this proposed solar facility at certain times of the year. These OPs of interest are OPs: #2, #3, #4, #5, #6, #7, #8, #9, #13, #15, #17, #40, #41, #42, #43, #44, #45 and #46. Out of the route receptors that were analyzed, all routes (Cloverleaf Rd., Knoll Dr., Rob Dr., Schwanger Rd., and S.R. 283) showed potential both green and yellow glare for a period throughout the year.

Green glare is considered to have a low potential to cause an afterimage (flash blindness) when observed prior to a typical blink response time. According to the FAA guidelines, green glare is seen as an acceptable level of reflectance for both ground level and aviation observers. Since green glare has low potential for after-image effects, it is often considered to have the same impacts as, or is comparable to, viewing a standard camera flash. Yellow glare does have the potential for after-image effects and is often compared to viewing a bright light in a dark room or viewing the sun's reflection from a water surface.

This model uses assumptions that are detailed on the "Assumptions" page of the Glare Report (Appendix A) some of which yield conservative results that may depict more glare than can be expected upon project completion, such as the assumption that there are clear, sunny skies year-round. The ocular hazard predicted by the SGHAT depends on a number of environmental, optical, and human factors which can often be uncertain. This analysis was completed with the typical ranges of values for these factors, however since these factors can vary on a day-to-day basis, and by location, it should be noted that more rigorous modeling outputs may be necessary to determine more precise results.

Overall, it can be anticipated that when the anti-reflection design elements of the solar panels to be used at this facility and the mitigating features of the site itself (proposed screening trees, existing vegetation, and topography) are considered, it can be concluded that glare will likely be further minimized from the outputs detailed in this analysis.

SECTION 5: REFERENCES

2018, *Technical Guidance for Evaluating Selected Solar Technologies on Airports*, 2018.pdf

ForgeSolar, 2016, www.forgesolar.com

2025, *Newly planted trees survival guide - South Carolina Forestry Commission*,
<https://www.scfc.gov/management/urban-forestry/urban-tree-care-resources/newly-planted-trees-survival-guide/>

APPENDIX A.

SGHAT Glare Analysis

FORGESOLAR GLARE ANALYSIS

Project: **Schwanger Road Solar**

3.0 MW AC solar project.

Site configuration: **September 2026 V2**

Calculated via ForgeSolar Radiometric Physics Engine v3.2.1

Client: Abundant Solar Power

Created 15 Sep, 2026

Updated 22 Sep, 2026

Time-step 1 minute

Timezone offset UTC-5

Minimum sun altitude 0.0 deg

DNI peaks at 1,000.0 W/m²

Category 1 MW to 5 MW

Site ID 187900.30896

Ocular transmission coefficient 0.5

Pupil diameter 0.002 m

Eye focal length 0.017 m

Sun subtended angle 9.3 mrad

Min luminance threshold 5,000 cd/m²



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

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	
Northern Array	30.0	180.0	39,940	665.7	6,741	112.3	-
Southern Array	30.0	180.0	25,903	431.7	13,750	229.2	-

Total 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
Cloverleaf Road - SR 4025	5,156	85.9	1,698	28.3
Knoll Drive	4,676	77.9	1,144	19.1
Rob Drive	165	2.8	332	5.5
Schwanger Road	4,047	67.5	341	5.7
SR 283 North Cartway	6,102	101.7	2,580	43.0
SR 283 South Cartway	6,135	102.2	4,909	81.8
SR 283 South On-Ramp	4,028	67.1	2,717	45.3
OP 1	0	0.0	0	0.0
OP 2	177	3.0	0	0.0
OP 3	665	11.1	0	0.0
OP 4	1,258	21.0	0	0.0
OP 5	1,886	31.4	39	0.7

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 6	1,935	32.2	0	0.0
OP 7	2,489	41.5	234	3.9
OP 8	3,011	50.2	612	10.2
OP 9	4,100	68.3	1,012	16.9
OP 10	0	0.0	0	0.0
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OP 14	0	0.0	0	0.0
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OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 36	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 38	0	0.0	0	0.0
OP 39	0	0.0	0	0.0
OP 40	723	12.1	0	0.0
OP 41	457	7.6	0	0.0
OP 42	3,427	57.1	1,161	19.4
OP 43	3,944	65.7	1,289	21.5
OP 44	2,095	34.9	0	0.0
OP 45	4,006	66.8	96	1.6
OP 46	732	12.2	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 49	0	0.0	0	0.0
OP 50	0	0.0	0	0.0
OP 51	0	0.0	0	0.0
OP 52	0	0.0	0	0.0
OP 53	0	0.0	0	0.0
OP 54	0	0.0	0	0.0
OP 55	0	0.0	0	0.0

Component Data

PV Arrays

Name: Northern Array
Axis tracking: Fixed (no rotation)
Tilt: 30.0°
Orientation: 180.0°
Rated power: -
Panel material: Smooth glass with AR coating (revised)



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.142561	-76.556258	434.37	8.50	442.87
2	40.142178	-76.556633	428.02	8.50	436.52
3	40.141822	-76.556744	423.99	8.50	432.49
4	40.141086	-76.556756	429.47	8.50	437.97
5	40.140961	-76.556633	429.03	8.50	437.53
6	40.140950	-76.555533	426.00	8.50	434.50
7	40.141036	-76.555256	426.37	8.50	434.87
8	40.141528	-76.554200	429.96	8.50	438.46
9	40.141808	-76.554631	441.62	8.50	450.12

Name: Southern Array
Axis tracking: Fixed (no rotation)
Tilt: 30.0°
Orientation: 180.0°
Rated power: -
Panel material: Smooth glass with AR coating (revised)



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.141386	-76.553958	429.21	8.50	437.71
2	40.140758	-76.555272	426.09	8.50	434.59
3	40.140686	-76.555889	424.24	8.50	432.74
4	40.140622	-76.556317	423.84	8.50	432.34
5	40.140167	-76.556322	418.61	8.50	427.11
6	40.140133	-76.552853	453.51	8.50	462.01
7	40.140658	-76.552844	446.19	8.50	454.69

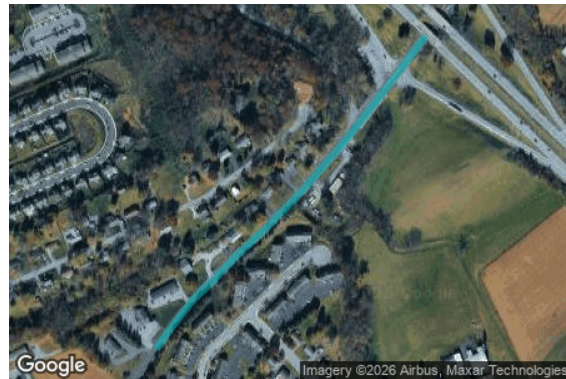
Route Receptors

Name: Cloverleaf Road - SR 4025

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



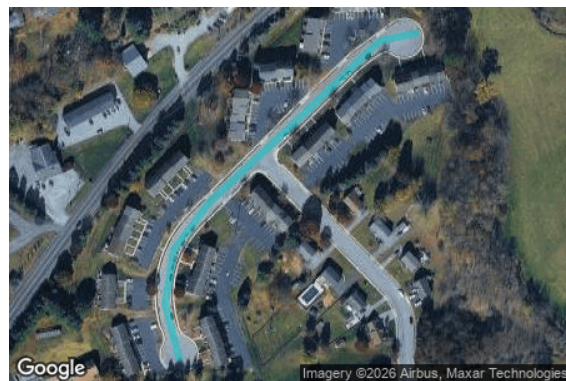
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.143521	-76.556128	437.10	4.50	441.60
2	40.143070	-76.556568	433.39	4.50	437.89
3	40.142225	-76.557426	436.92	4.50	441.42
4	40.141552	-76.558182	447.63	4.50	452.13
5	40.141056	-76.558810	451.64	4.50	456.14
6	40.140663	-76.559363	445.32	4.50	449.82
7	40.140343	-76.559754	444.75	4.50	449.25
8	40.140121	-76.560071	448.17	4.50	452.67
9	40.139789	-76.560414	453.97	4.50	458.47
10	40.139486	-76.560704	456.57	4.50	461.07

Name: Knoll Drive

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.138582	-76.559830	429.07	4.50	433.57
2	40.138939	-76.559948	437.03	4.50	441.53
3	40.139291	-76.559873	448.38	4.50	452.88
4	40.139599	-76.559572	451.53	4.50	456.03
5	40.140214	-76.558708	445.36	4.50	449.86
6	40.140657	-76.558108	437.75	4.50	442.25
7	40.140710	-76.557791	433.17	4.50	437.67

Name: Rob Drive

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.139919	-76.559122	447.29	4.50	451.79
2	40.138963	-76.557920	417.92	4.50	422.42
3	40.137897	-76.557830	422.87	4.50	427.37

Name: Schwanger Road

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.139913	-76.549223	474.65	4.50	479.15
2	40.139799	-76.549979	465.25	4.50	469.75
3	40.139388	-76.551530	456.59	4.50	461.09
4	40.139003	-76.553016	452.49	4.50	456.99
5	40.138265	-76.555886	409.10	4.50	413.60
6	40.137974	-76.556980	419.37	4.50	423.87
7	40.137916	-76.557860	422.52	4.50	427.02

Name: SR 283 North Cartway

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.139515	-76.550131	478.17	4.50	482.67
2	40.143821	-76.555935	446.17	4.50	450.67

Name: SR 283 South Cartway

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.144116	-76.556794	457.75	4.50	462.25
2	40.142435	-76.554552	457.60	4.50	462.10
3	40.141656	-76.553425	462.47	4.50	466.97
4	40.140270	-76.551601	471.77	4.50	476.27
5	40.139359	-76.550389	476.84	4.50	481.34

Name: SR 283 South On-Ramp

Path type: Two-way

Azimuthal view angle: 50.0°

Downward view angle: 90.0°



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.143053	-76.556557	433.20	4.50	437.70
2	40.142676	-76.555736	439.18	4.50	443.68
3	40.142032	-76.554288	457.17	4.50	461.67
4	40.141827	-76.553886	459.99	4.50	464.49
5	40.141123	-76.552846	465.36	4.50	469.86
6	40.140795	-76.552406	467.62	4.50	472.12

Discrete Observation Point Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	40.141600	-76.557613	435.43	7.00
OP 2	2	40.142346	-76.557962	469.48	7.00
OP 3	3	40.142346	-76.557962	469.48	15.00
OP 4	4	40.142084	-76.558219	468.65	7.00
OP 5	5	40.142084	-76.558219	468.65	15.00
OP 6	6	40.141871	-76.558423	467.08	7.00
OP 7	7	40.141871	-76.558423	467.08	15.00
OP 8	8	40.141502	-76.558783	468.15	7.00
OP 9	9	40.141502	-76.558783	468.15	15.00
OP 10	10	40.140919	-76.558198	435.38	7.00
OP 11	11	40.140919	-76.558198	435.38	15.00
OP 12	12	40.140394	-76.557753	434.20	7.00
OP 13	13	40.140394	-76.557753	434.20	15.00
OP 14	14	40.139607	-76.558332	433.44	7.00
OP 15	15	40.139607	-76.558332	433.44	15.00
OP 16	16	40.139427	-76.558085	427.54	7.00
OP 17	17	40.139427	-76.558085	427.54	15.00
OP 18	18	40.139209	-76.557833	421.90	7.00
OP 19	19	40.139209	-76.557833	421.90	14.00
OP 20	20	40.139029	-76.557731	417.13	7.00
OP 21	21	40.139029	-76.557731	417.13	15.00
OP 22	22	40.138110	-76.557586	418.81	7.00
OP 23	23	40.138110	-76.557586	418.81	15.00
OP 24	24	40.138127	-76.557195	418.65	7.00
OP 25	25	40.138122	-76.557195	418.86	15.00
OP 26	26	40.138196	-76.556873	416.45	7.00
OP 27	27	40.138196	-76.556873	416.45	15.00
OP 28	28	40.138401	-76.556513	412.39	7.00
OP 29	29	40.138401	-76.556513	412.39	15.00
OP 30	30	40.138971	-76.555859	413.79	7.00
OP 31	31	40.138967	-76.555864	413.79	15.00
OP 32	32	40.137833	-76.556326	428.82	7.00
OP 33	33	40.137833	-76.556326	428.82	15.00
OP 34	34	40.137825	-76.555878	426.23	7.00
OP 35	35	40.137825	-76.555878	426.23	15.00
OP 36	36	40.138004	-76.554443	424.91	7.00
OP 37	37	40.138004	-76.554443	424.91	15.00
OP 38	38	40.138723	-76.553206	450.83	7.00
OP 39	39	40.138723	-76.553206	450.83	15.00
OP 40	40	40.138701	-76.552257	447.51	7.00
OP 41	41	40.138701	-76.552257	447.51	15.00
OP 42	42	40.139490	-76.552407	472.28	7.00
OP 43	43	40.139490	-76.552407	472.28	15.00
OP 44	44	40.139191	-76.550964	469.37	7.00
OP 45	45	40.139191	-76.550964	469.37	15.00
OP 46	46	40.141180	-76.550964	466.97	7.00
OP 47	47	40.142340	-76.550454	463.38	7.00
OP 48	48	40.143316	-76.552037	451.78	7.00
OP 49	49	40.143726	-76.553029	467.46	7.00
OP 50	50	40.145022	-76.552069	483.92	7.00
OP 51	51	40.145022	-76.553571	478.10	7.00
OP 52	52	40.145022	-76.553571	478.10	15.00

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 53	53	40.144764	-76.555416	445.63	7.00
OP 54	54	40.144444	-76.558474	444.20	7.00
OP 55	55	40.144444	-76.558474	444.20	15.00

Obstruction Components

Name: Existing Treeline 1
Top height: 32.81 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.142547	-76.556974	432.06
2	40.142399	-76.556754	426.83
3	40.141456	-76.557404	414.35
4	40.141079	-76.556851	427.03
5	40.140792	-76.556669	424.70

Name: Existing Treeline 2
Top height: 32.81 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.141981	-76.554593	451.24
2	40.141678	-76.553911	449.03
3	40.140827	-76.552694	455.08

Name: Existing Treeline 3

Top height: 32.81 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.141226	-76.557247	413.07
2	40.140931	-76.557590	422.45
3	40.140471	-76.557268	414.63
4	40.139339	-76.557247	407.33
5	40.138388	-76.556077	405.49

Name: Existing Treeline 4

Top height: 32.81 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.138240	-76.555702	409.34
2	40.138396	-76.555058	414.27

Name: Existing Treeline 5

Top height: 32.81 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.138519	-76.554704	421.40
2	40.138864	-76.553417	448.79

Name: Proposed Screening 1

Top height: 6.00 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.140664	-76.552765	446.37
2	40.140088	-76.552767	455.88
3	40.140096	-76.556437	417.54
4	40.140648	-76.556429	424.96

Name: Proposed Screening 2

Top height: 6.00 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.141523	-76.554061	429.35
2	40.141831	-76.554587	441.88
3	40.142665	-76.556357	433.74

Name: Proposed Screening 3

Top height: 6.00 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.142424	-76.556431	431.09
2	40.142180	-76.556677	427.11
3	40.141823	-76.556787	423.56
4	40.141095	-76.556790	428.61
5	40.140829	-76.556568	426.89

Name: Proposed Screening 4

Top height: 6.00 ft



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)
1	40.140666	-76.552770	446.29
2	40.141452	-76.553945	428.99

Glare Analysis Results

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

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
Northern Array	30.0	180.0	39,940	665.7	6,741	112.3	-
Southern Array	30.0	180.0	25,903	431.7	13,750	229.2	-

Total 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
Cloverleaf Road - SR 4025	5,156	85.9	1,698	28.3
Knoll Drive	4,676	77.9	1,144	19.1
Rob Drive	165	2.8	332	5.5
Schwanger Road	4,047	67.5	341	5.7
SR 283 North Cartway	6,102	101.7	2,580	43.0
SR 283 South Cartway	6,135	102.2	4,909	81.8
SR 283 South On-Ramp	4,028	67.1	2,717	45.3
OP 1	0	0.0	0	0.0
OP 2	177	3.0	0	0.0
OP 3	665	11.1	0	0.0
OP 4	1,258	21.0	0	0.0
OP 5	1,886	31.4	39	0.7
OP 6	1,935	32.2	0	0.0
OP 7	2,489	41.5	234	3.9
OP 8	3,011	50.2	612	10.2
OP 9	4,100	68.3	1,012	16.9
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	1,368	22.8	421	7.0
OP 14	0	0.0	0	0.0
OP 15	1,569	26.1	1,415	23.6
OP 16	0	0.0	0	0.0
OP 17	1,692	28.2	491	8.2
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 36	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 38	0	0.0	0	0.0
OP 39	0	0.0	0	0.0
OP 40	723	12.1	0	0.0
OP 41	457	7.6	0	0.0
OP 42	3,427	57.1	1,161	19.4
OP 43	3,944	65.7	1,289	21.5
OP 44	2,095	34.9	0	0.0
OP 45	4,006	66.8	96	1.6
OP 46	732	12.2	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 50	0	0.0	0	0.0
OP 51	0	0.0	0	0.0
OP 52	0	0.0	0	0.0
OP 53	0	0.0	0	0.0
OP 54	0	0.0	0	0.0
OP 55	0	0.0	0	0.0

PV: Northern Array potential temporary after-image

Receptor results ordered by category of glare

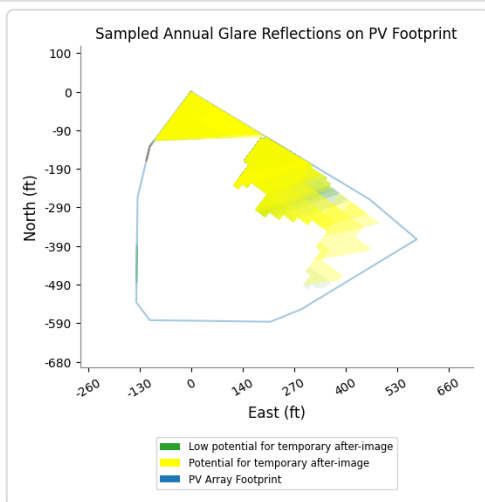
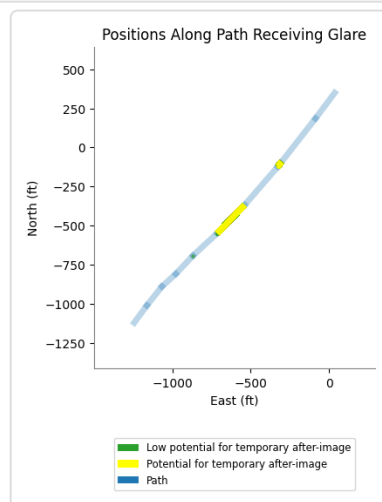
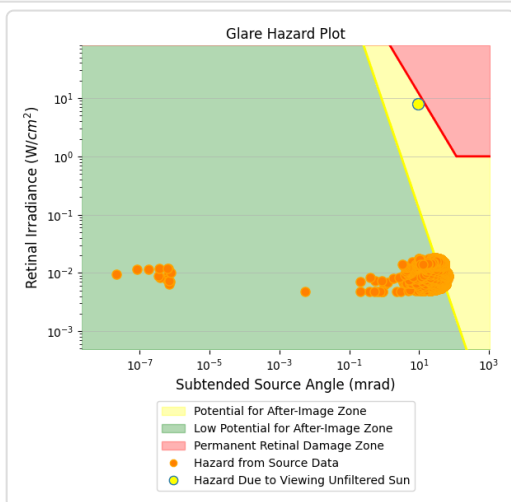
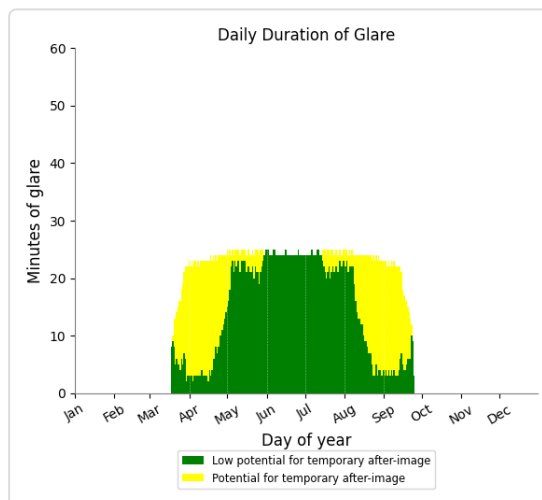
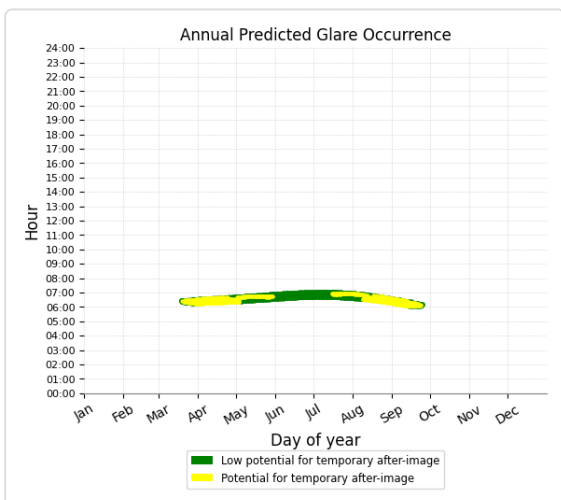
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cloverleaf Road - SR 4025	2,825	47.1	1,562	26.0
Schwanger Road	2,345	39.1	72	1.2
SR 283 North Cartway	3,227	53.8	843	14.1
SR 283 South Cartway	3,902	65.0	938	15.6
SR 283 South On-Ramp	2,963	49.4	1,429	23.8
Knoll Drive	2,292	38.2	0	0.0
Rob Drive	0	0.0	0	0.0
OP 5	1,886	31.4	39	0.7
OP 7	2,489	41.5	234	3.9
OP 8	3,011	50.2	612	10.2
OP 9	4,100	68.3	1,012	16.9
OP 2	177	3.0	0	0.0
OP 3	665	11.1	0	0.0
OP 4	1,258	21.0	0	0.0
OP 6	1,935	32.2	0	0.0
OP 42	1,595	26.6	0	0.0
OP 43	1,732	28.9	0	0.0
OP 44	1,019	17.0	0	0.0
OP 45	1,787	29.8	0	0.0
OP 46	732	12.2	0	0.0
OP 1	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 13	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 15	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 17	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0
OP 27	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 36	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 38	0	0.0	0	0.0
OP 39	0	0.0	0	0.0
OP 40	0	0.0	0	0.0
OP 41	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 50	0	0.0	0	0.0
OP 51	0	0.0	0	0.0
OP 52	0	0.0	0	0.0
OP 53	0	0.0	0	0.0
OP 54	0	0.0	0	0.0
OP 55	0	0.0	0	0.0

Northern Array and Route: Cloverleaf Road - SR 4025

Yellow glare: 1,562 min.

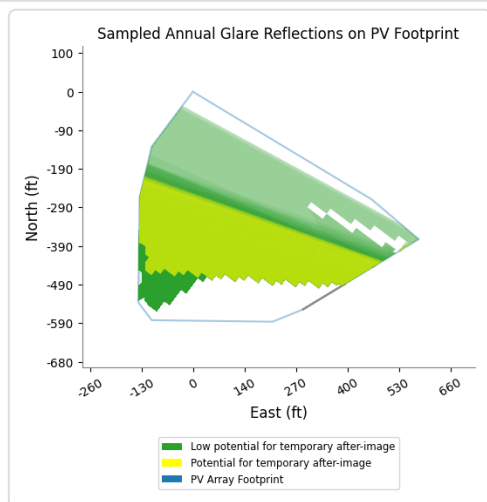
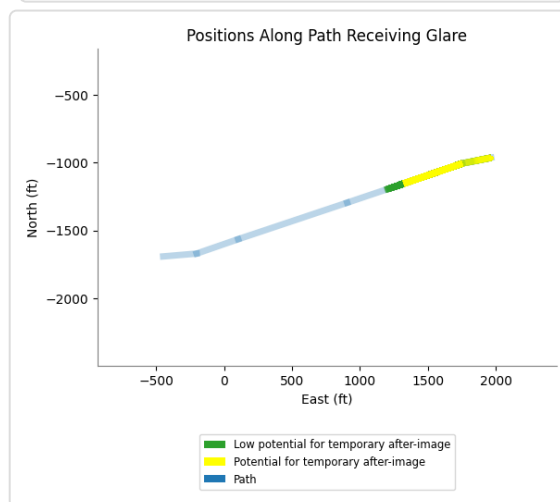
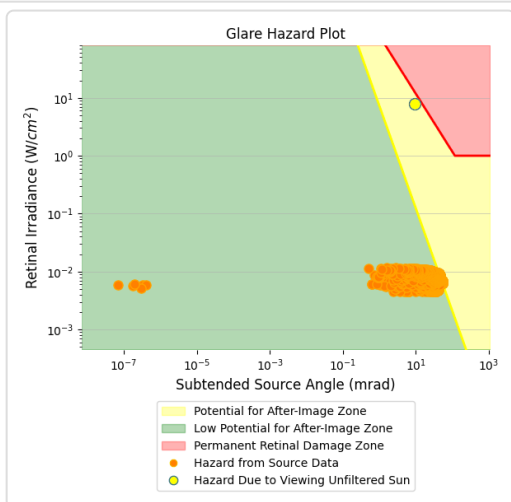
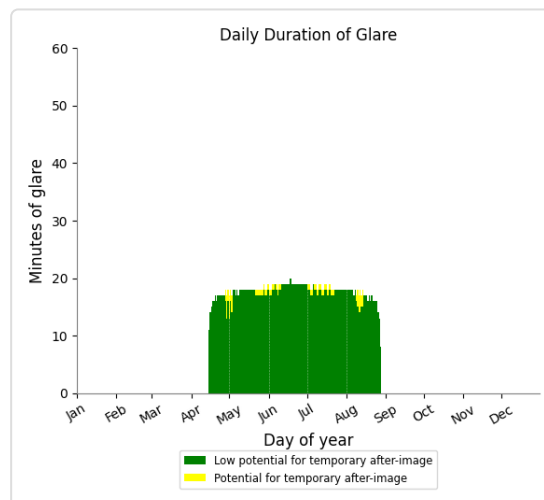
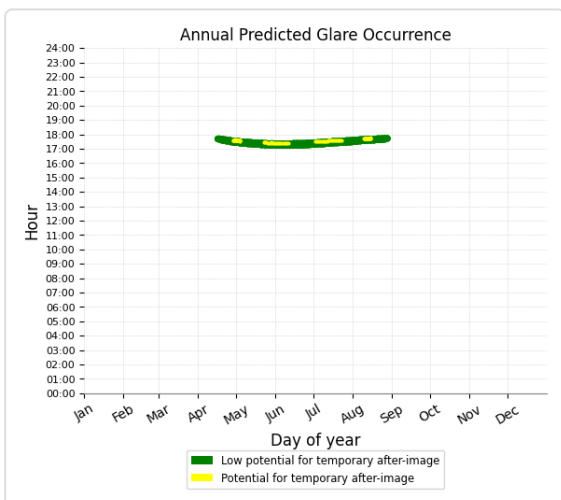
Green glare: 2,825 min.



Northern Array and Route: Schwanger Road

Yellow glare: 72 min.

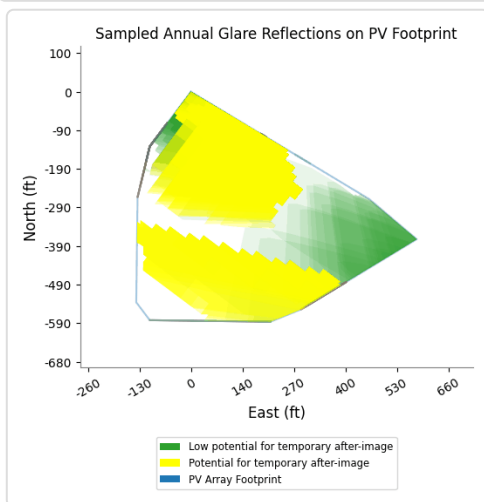
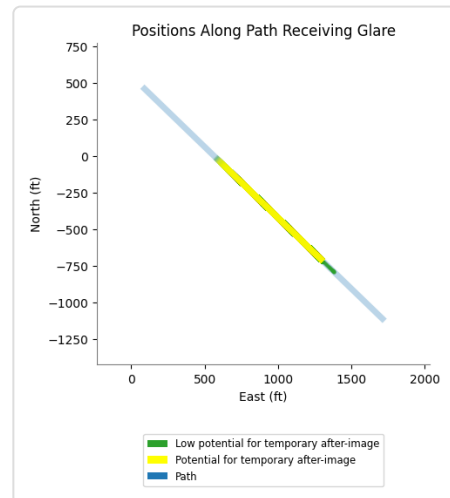
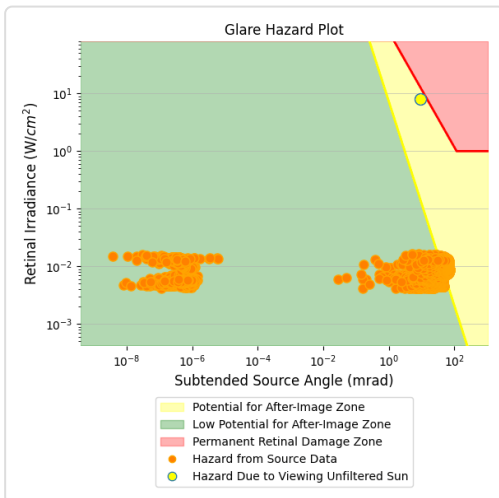
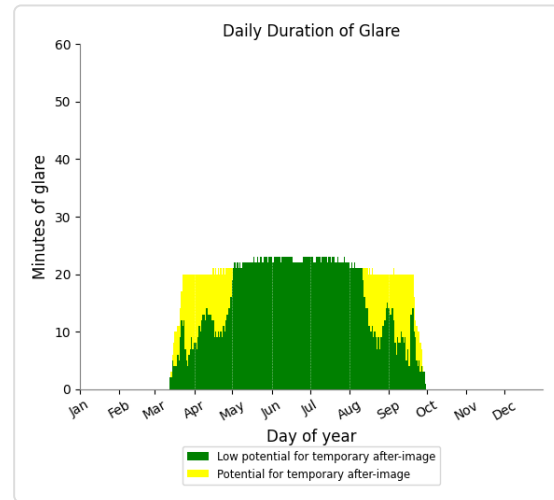
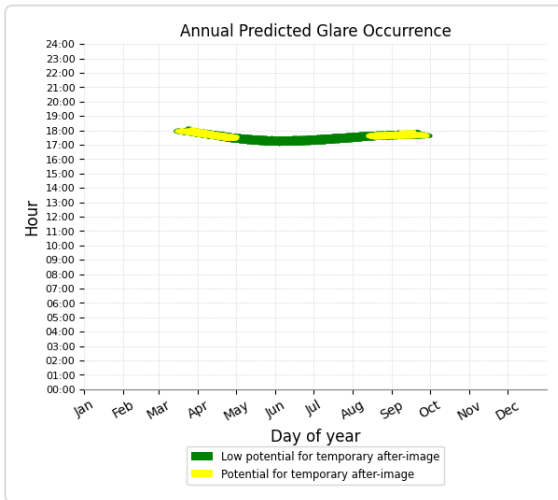
Green glare: 2,345 min.



Northern Array and Route: SR 283 North Cartway

Yellow glare: 843 min.

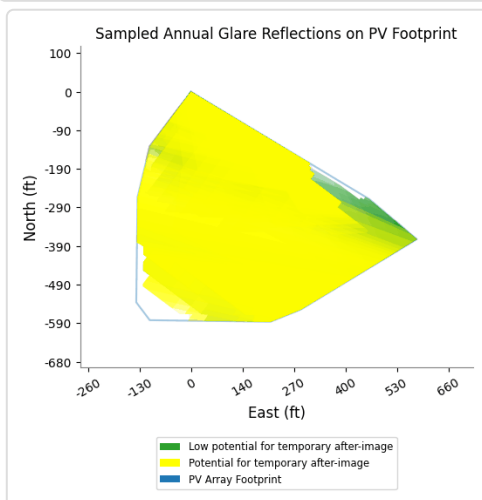
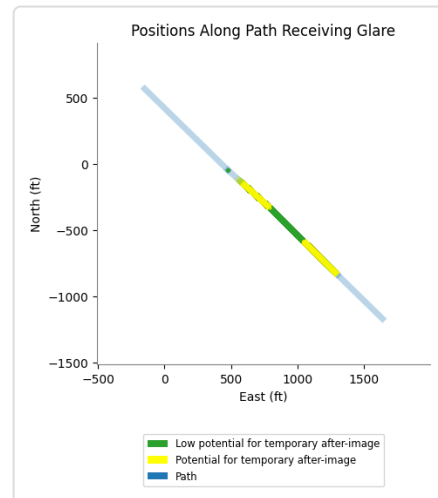
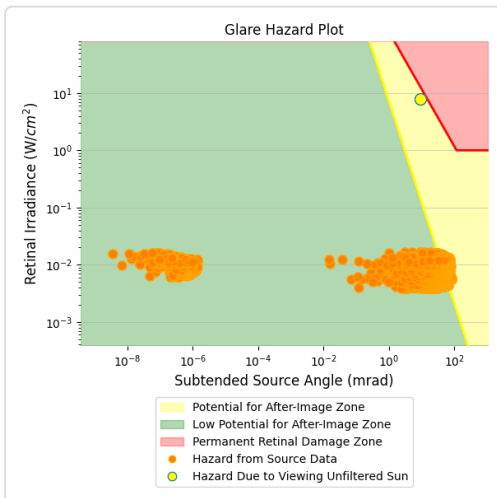
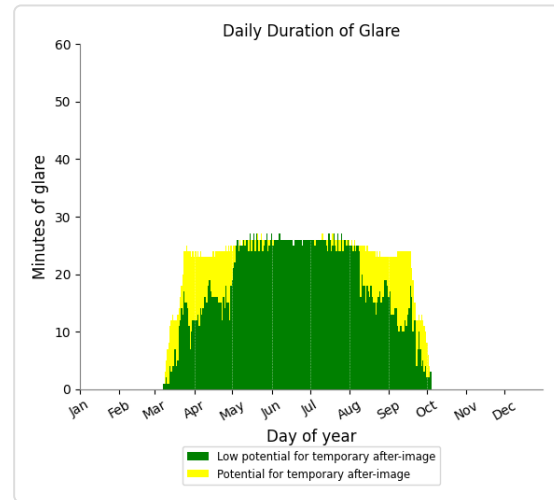
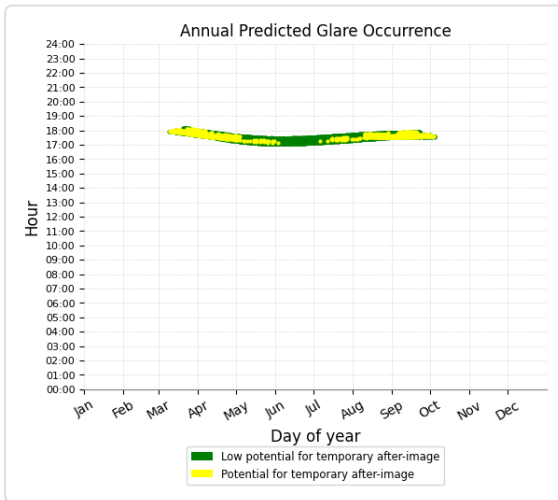
Green glare: 3,227 min.



Northern Array and Route: SR 283 South Cartway

Yellow glare: 938 min.

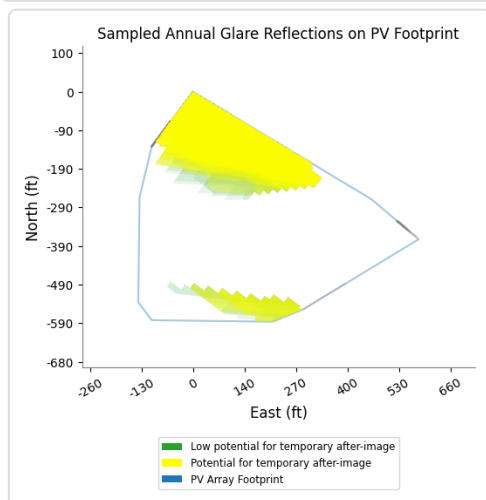
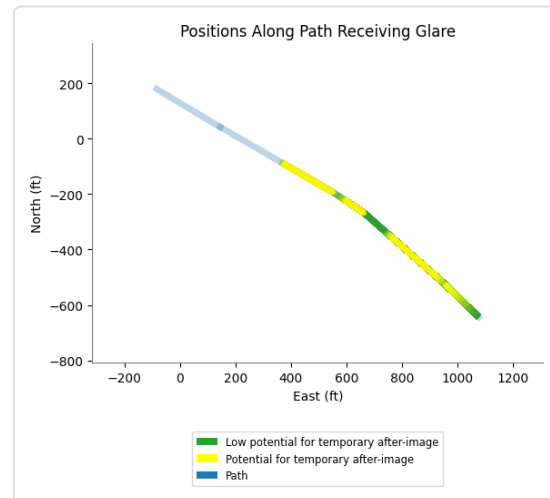
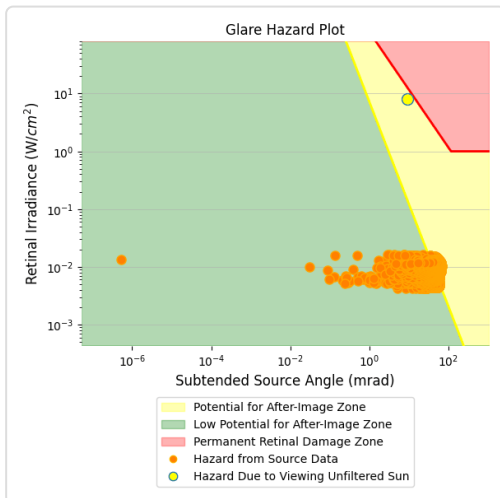
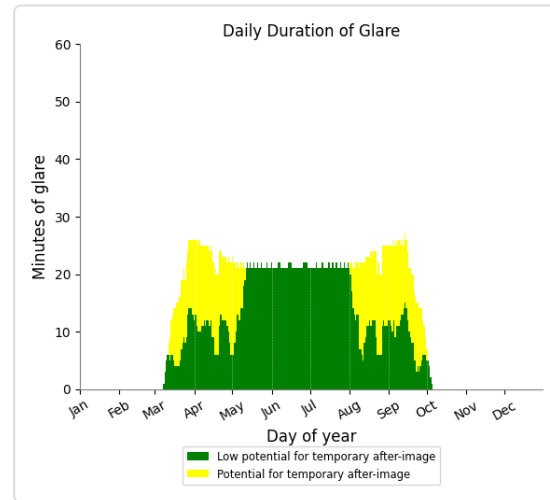
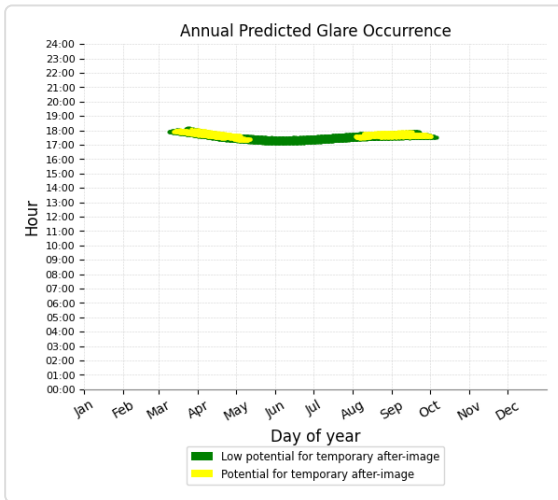
Green glare: 3,902 min.



Northern Array and Route: SR 283 South On-Ramp

Yellow glare: 1,429 min.

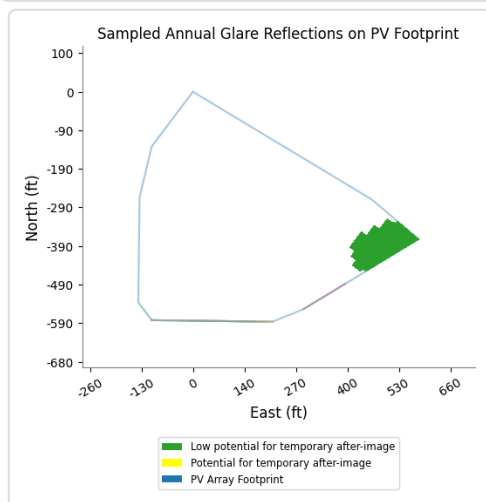
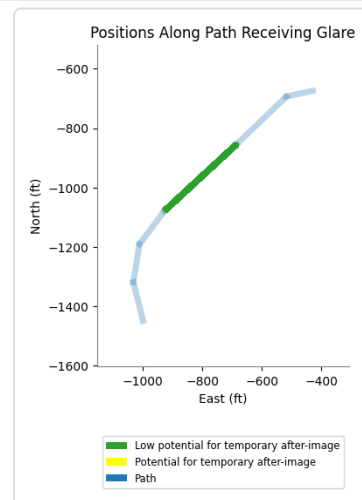
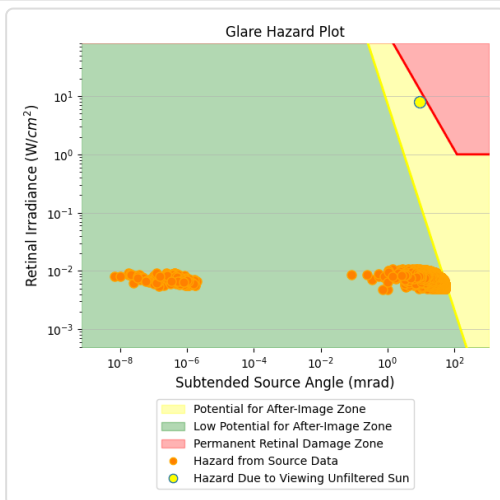
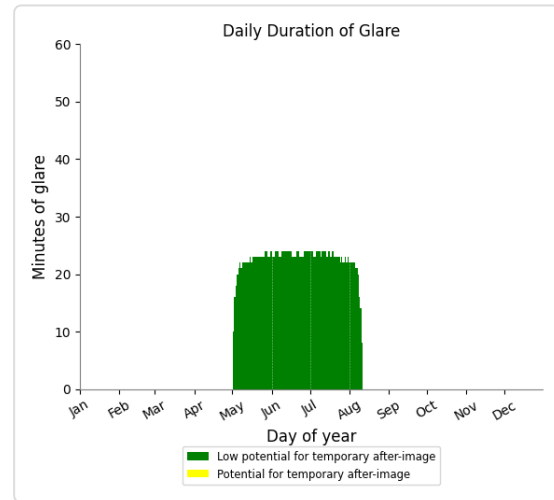
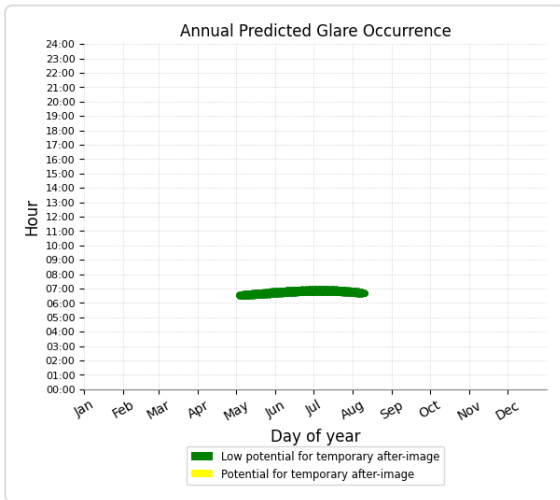
Green glare: 2,963 min.



Northern Array and Route: Knoll Drive

Yellow glare: none

Green glare: 2,292 min.



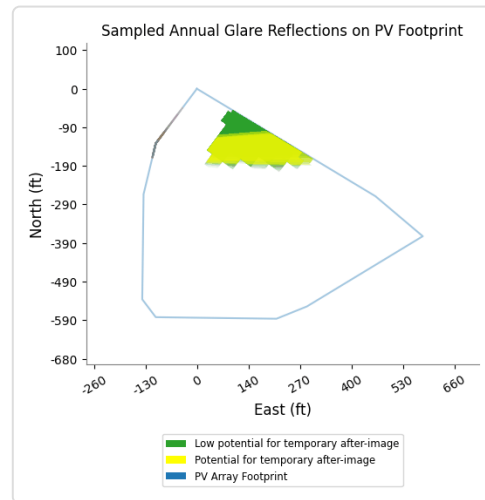
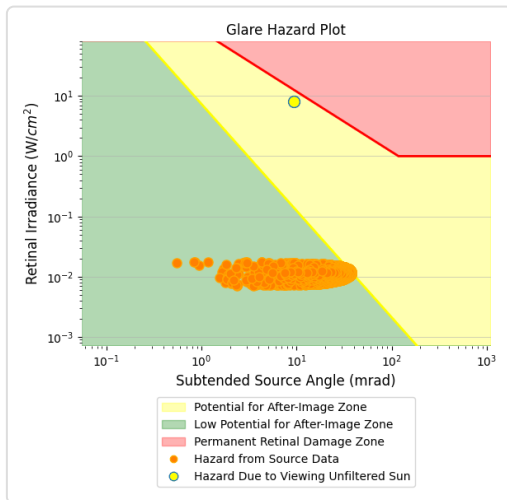
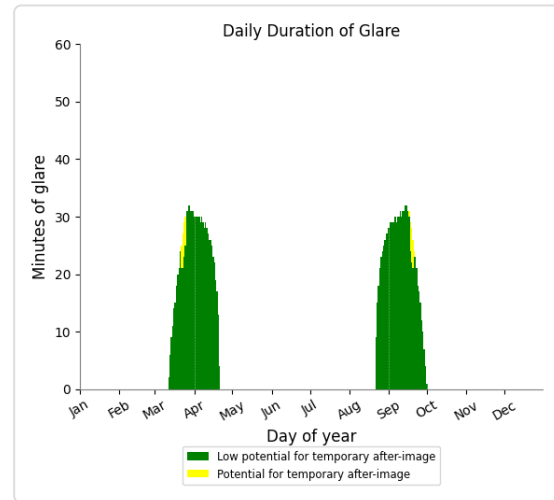
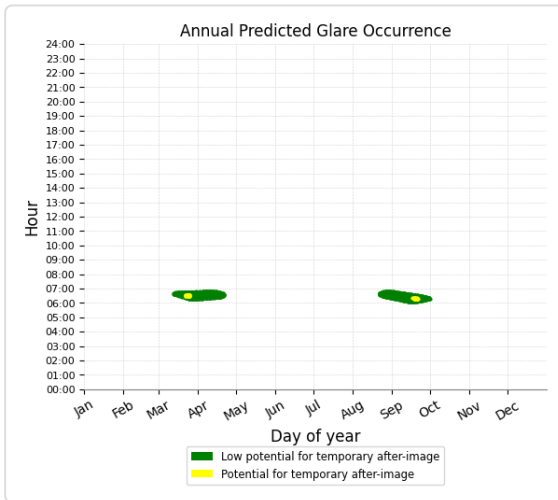
Northern Array and Route: Rob Drive

No glare found

Northern Array and OP 5

Yellow glare: 39 min.

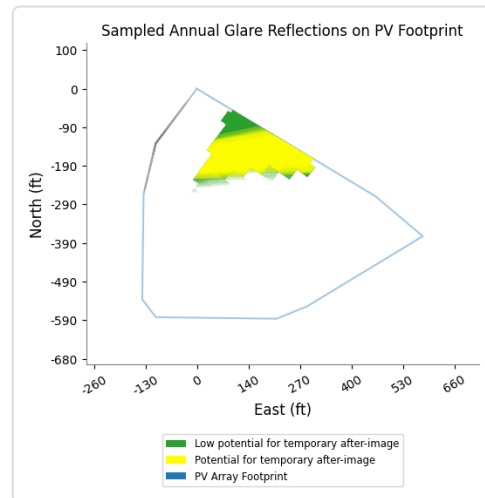
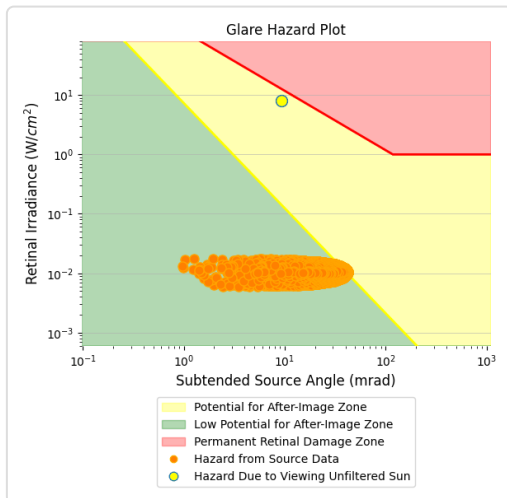
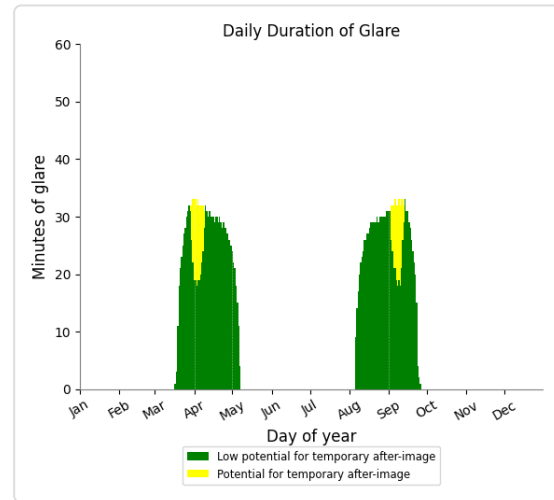
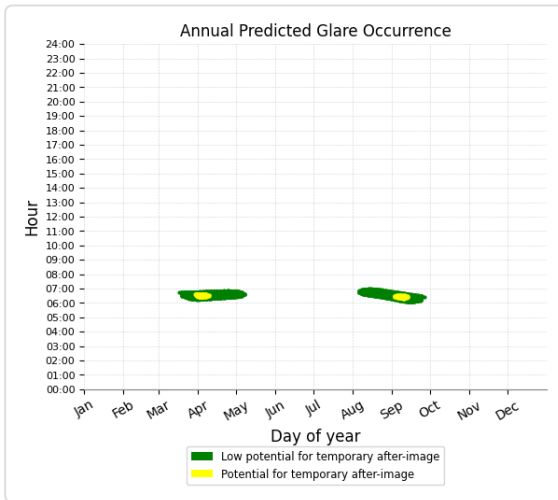
Green glare: 1,886 min.



Northern Array and OP 7

Yellow glare: 234 min.

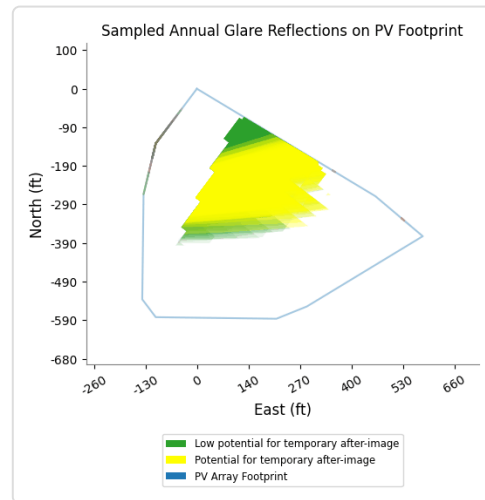
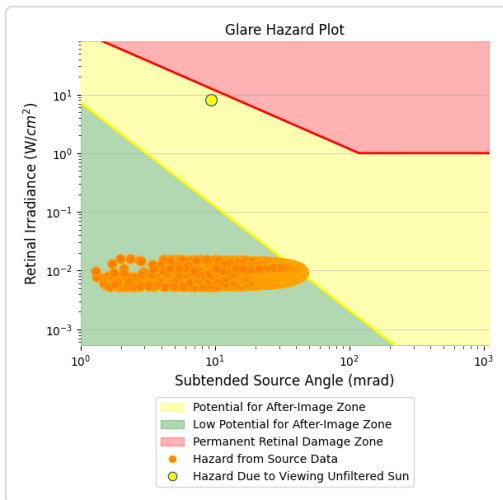
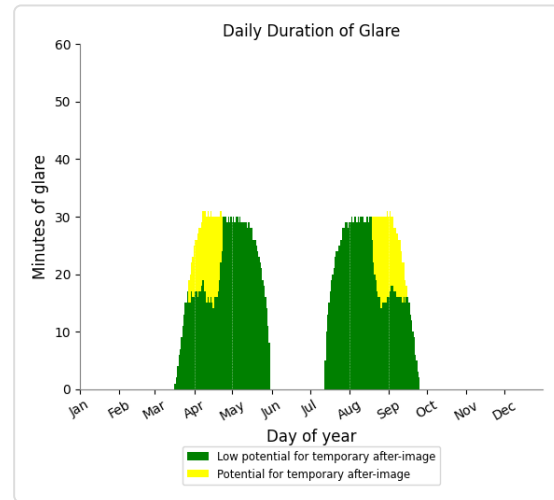
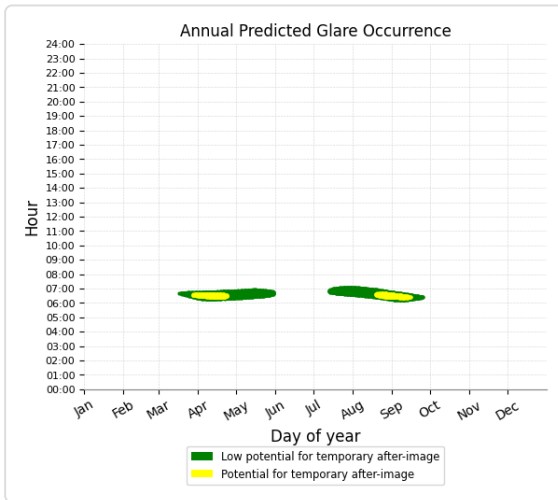
Green glare: 2,489 min.



Northern Array and OP 8

Yellow glare: 612 min.

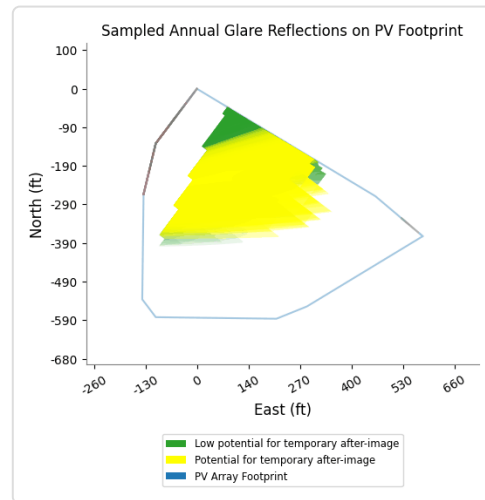
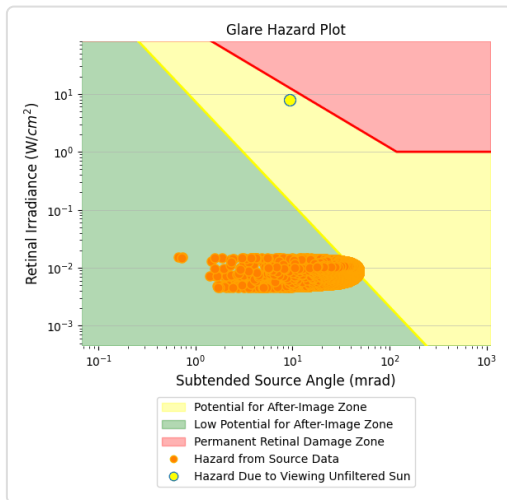
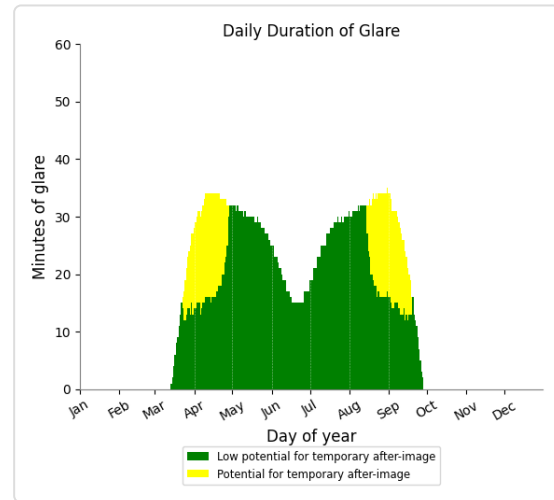
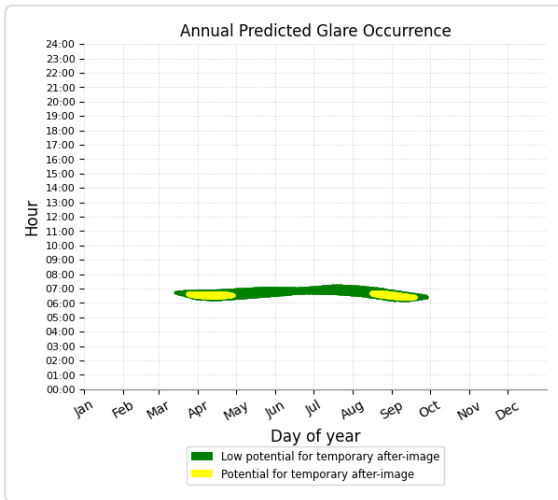
Green glare: 3,011 min.



Northern Array and OP 9

Yellow glare: 1,012 min.

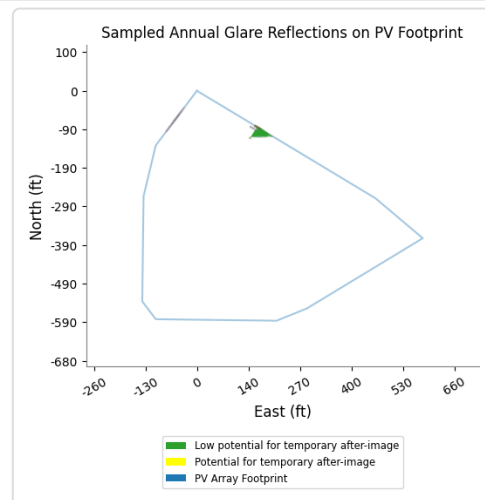
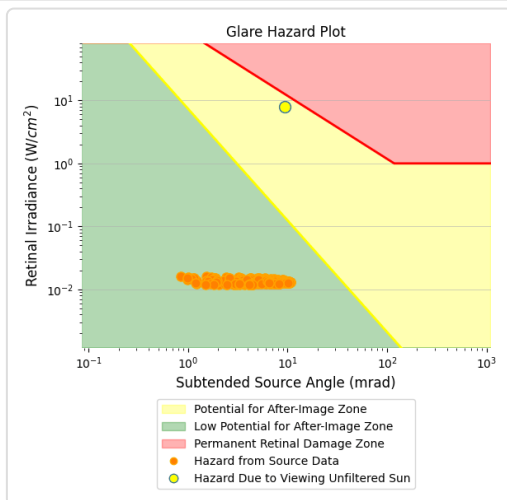
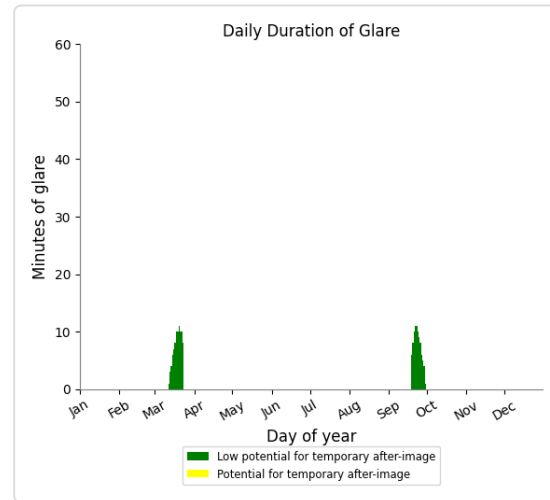
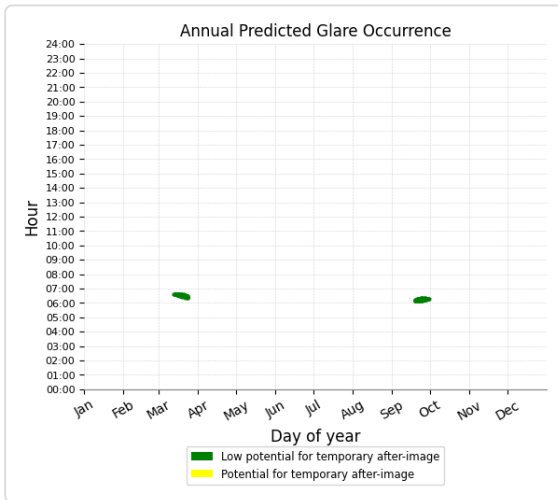
Green glare: 4,100 min.



Northern Array and OP 2

Yellow glare: none

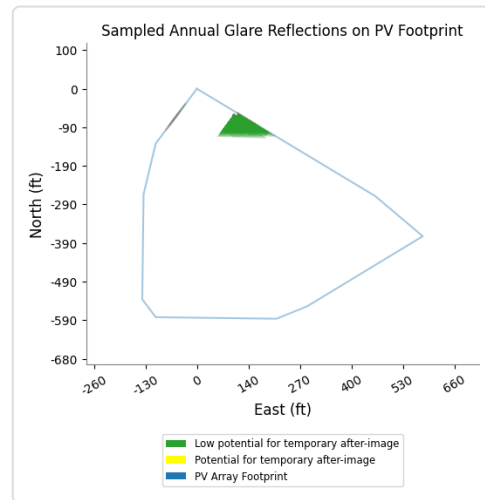
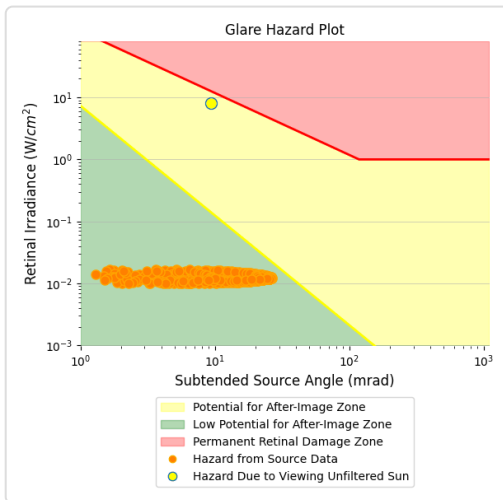
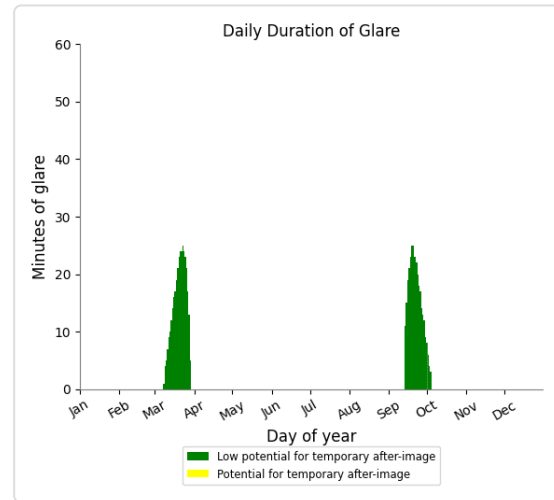
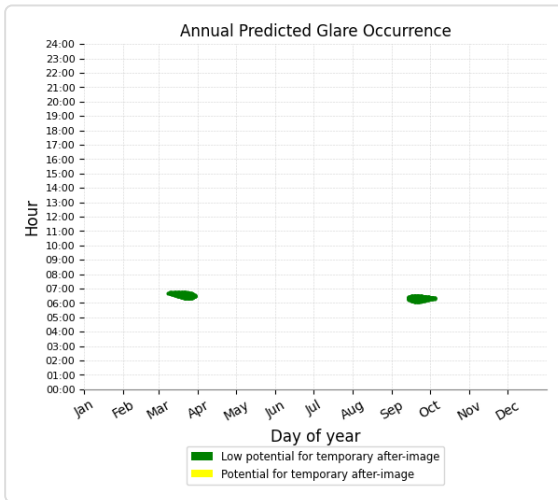
Green glare: 177 min.



Northern Array and OP 3

Yellow glare: none

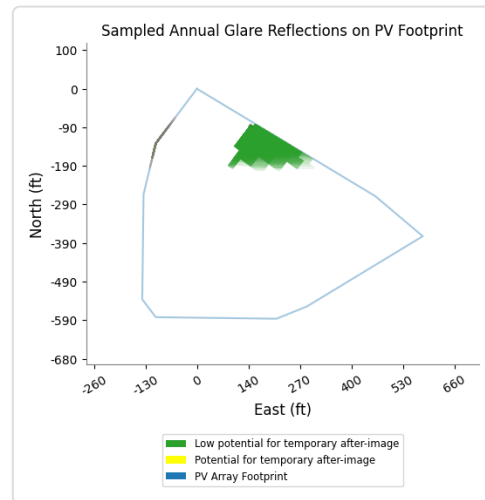
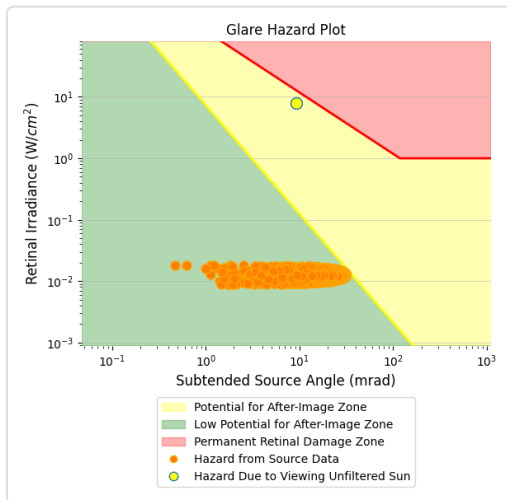
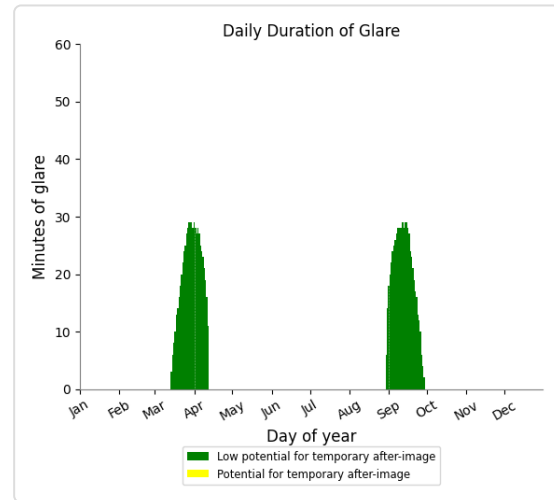
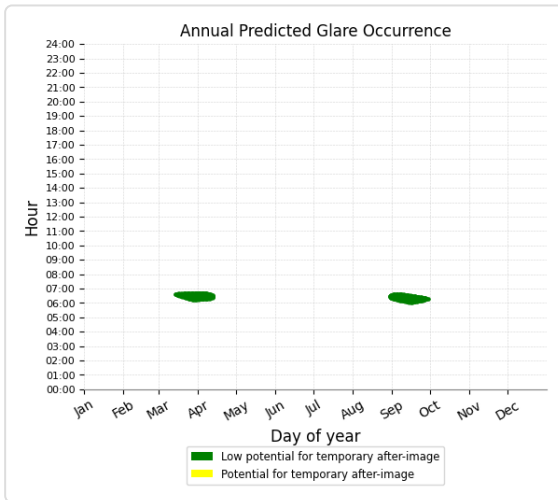
Green glare: 665 min.



Northern Array and OP 4

Yellow glare: none

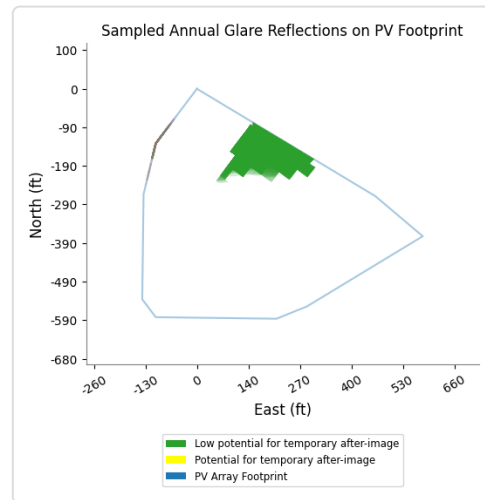
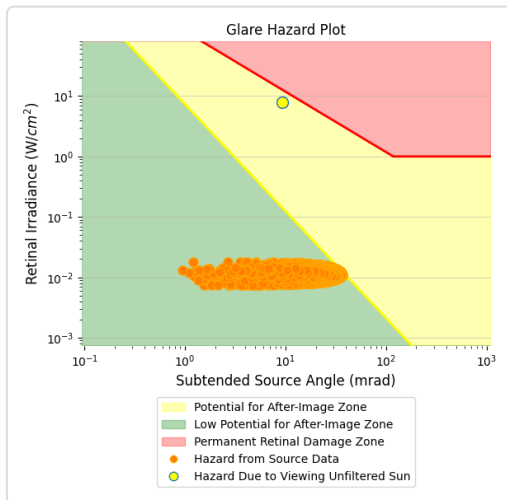
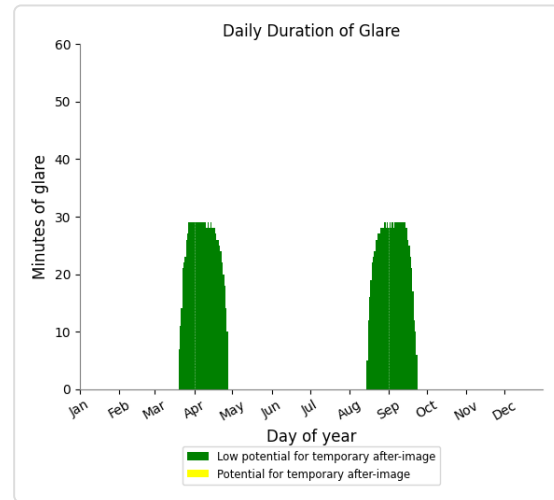
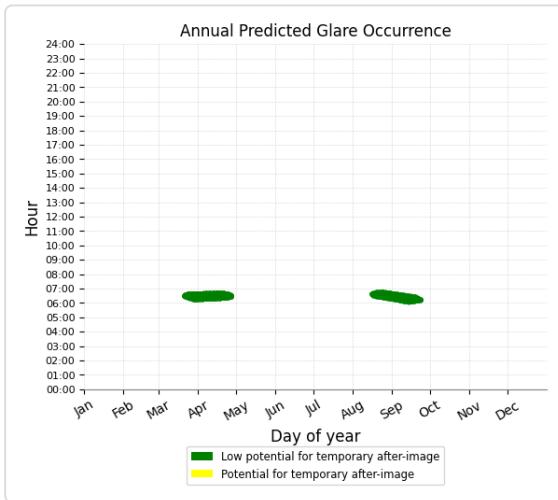
Green glare: 1,258 min.



Northern Array and OP 6

Yellow glare: none

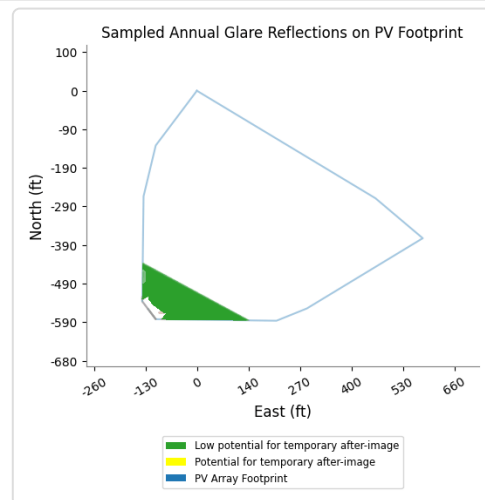
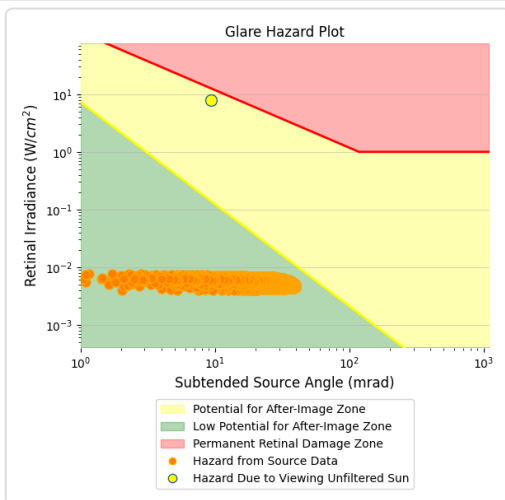
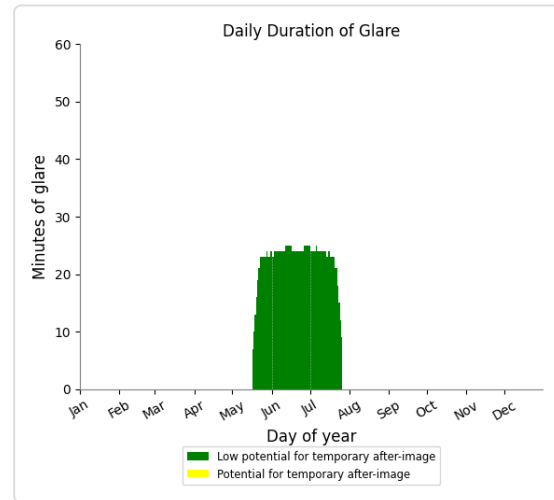
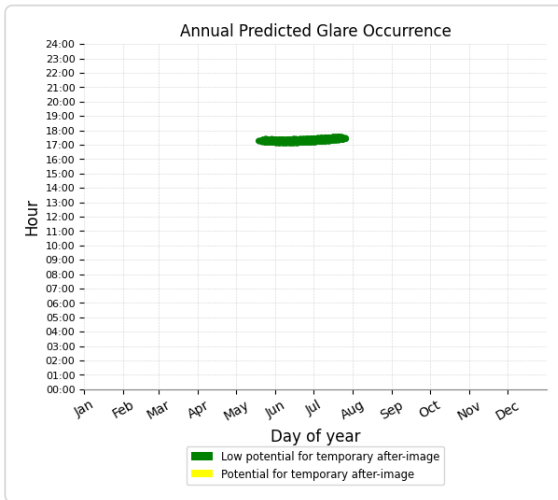
Green glare: 1,935 min.



Northern Array and OP 42

Yellow glare: none

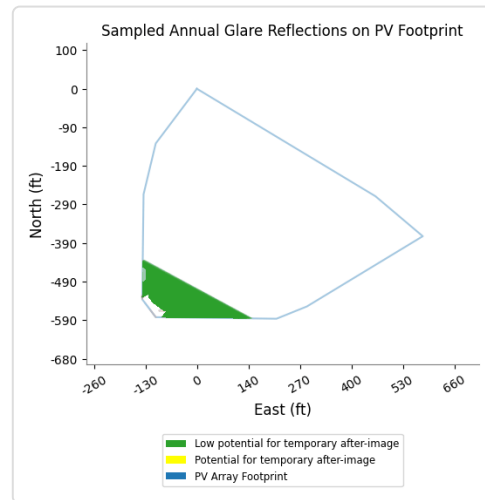
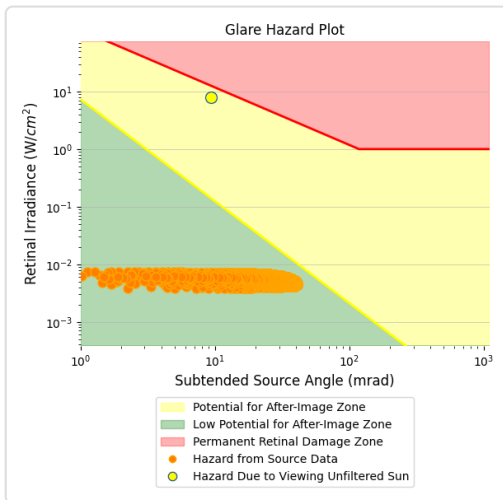
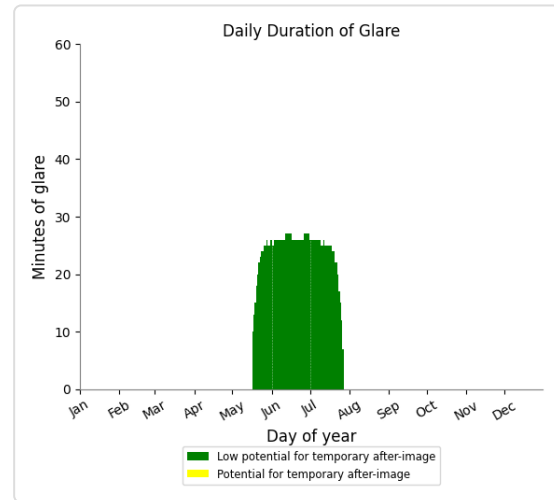
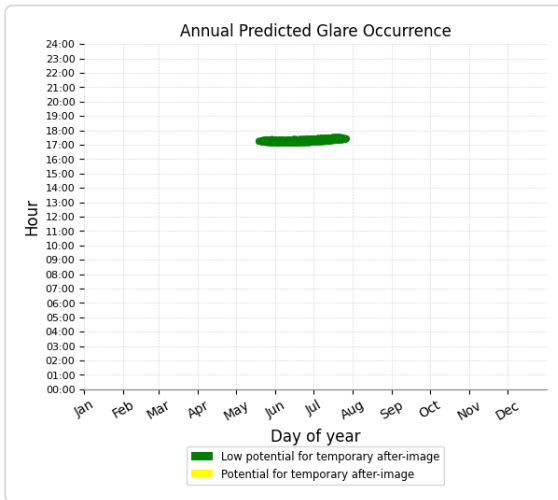
Green glare: 1,595 min.



Northern Array and OP 43

Yellow glare: none

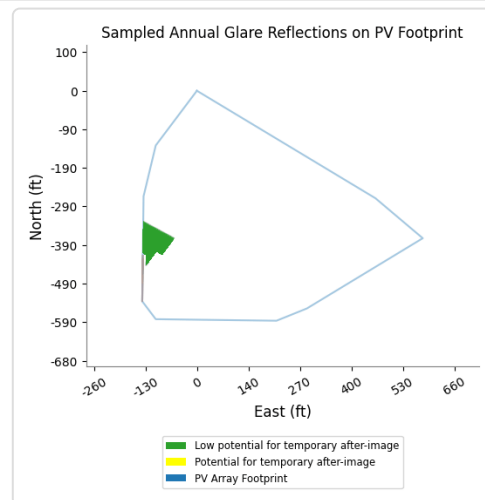
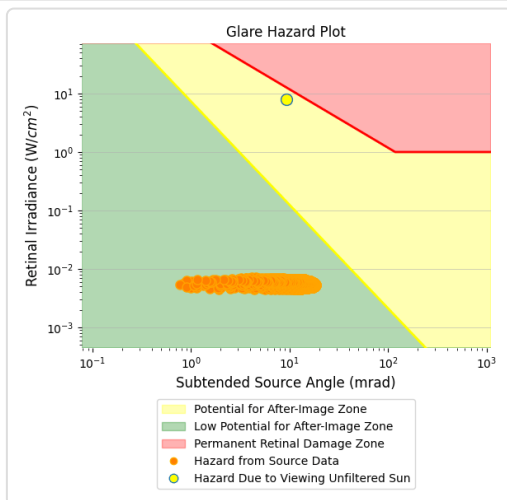
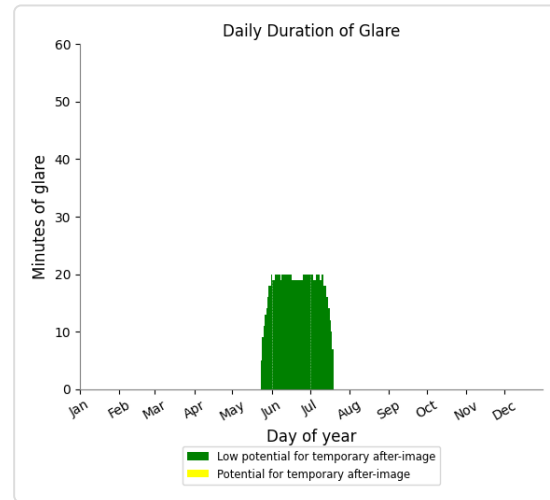
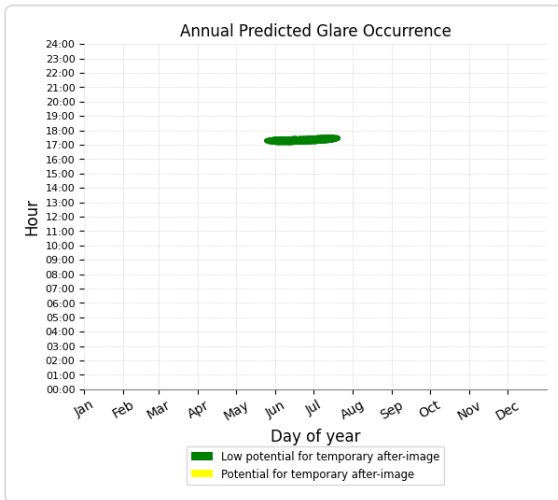
Green glare: 1,732 min.



Northern Array and OP 44

Yellow glare: none

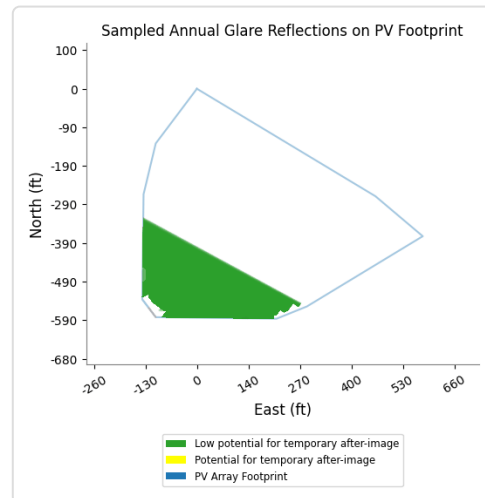
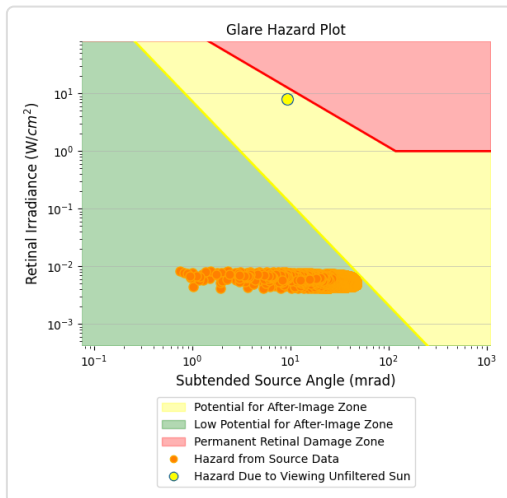
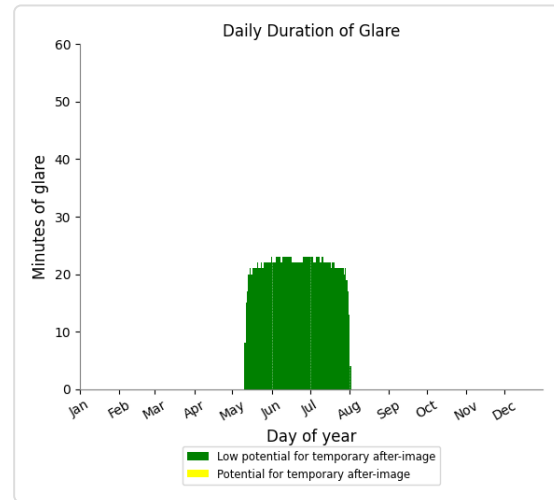
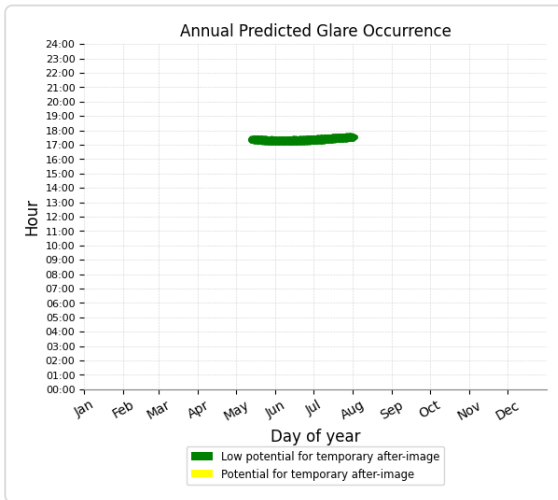
Green glare: 1,019 min.



Northern Array and OP 45

Yellow glare: none

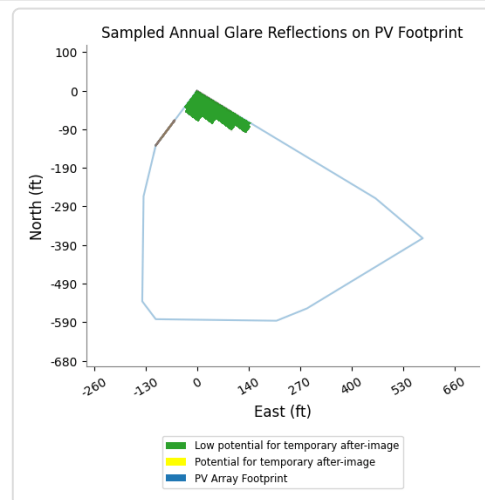
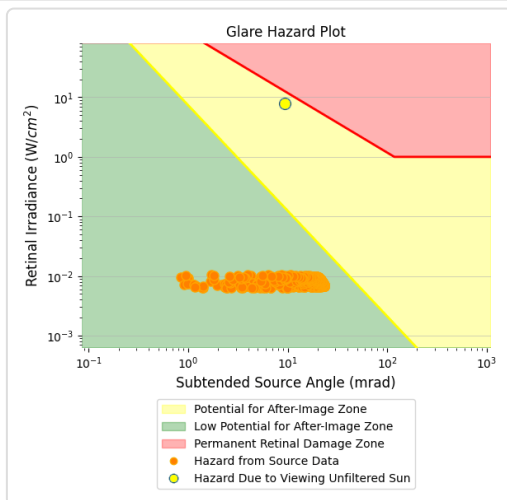
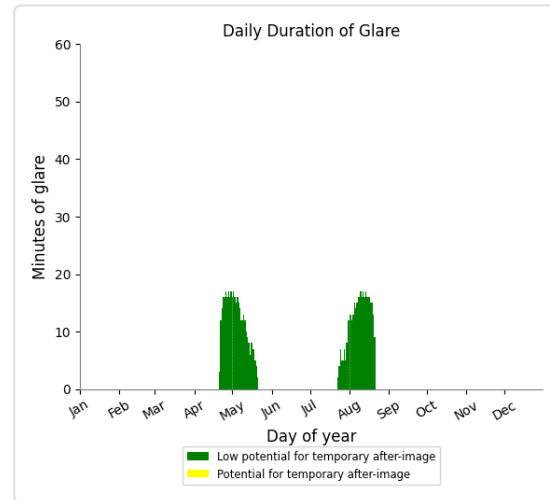
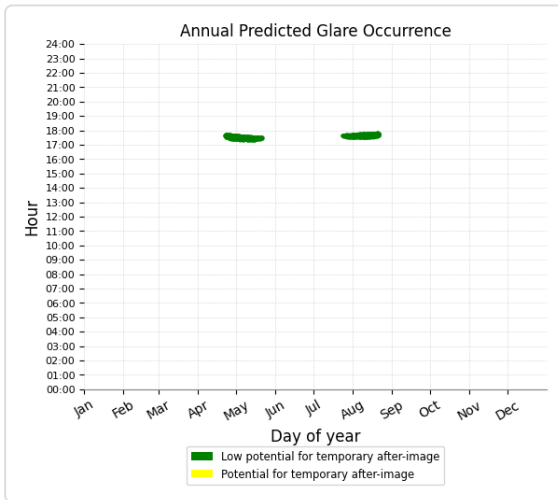
Green glare: 1,787 min.



Northern Array and OP 46

Yellow glare: none

Green glare: 732 min.



Northern Array and OP 1

No glare found

Northern Array and OP 10

No glare found

Northern Array and OP 11

No glare found

Northern Array and OP 12

No glare found

Northern Array and OP 13

No glare found

Northern Array and OP 14

No glare found

Northern Array and OP 15

No glare found

Northern Array and OP 16

No glare found

Northern Array and OP 17

No glare found

Northern Array and OP 18

No glare found

Northern Array and OP 19

No glare found

Northern Array and OP 20

No glare found

Northern Array and OP 21

No glare found

Northern Array and OP 22

No glare found

Northern Array and OP 23

No glare found

Northern Array and OP 24

No glare found

Northern Array and OP 25

No glare found

Northern Array and OP 26

No glare found

Northern Array and OP 27

No glare found

Northern Array and OP 28

No glare found

Northern Array and OP 29

No glare found

Northern Array and OP 30

No glare found

Northern Array and OP 31

No glare found

Northern Array and OP 32

No glare found

Northern Array and OP 33

No glare found

Northern Array and OP 34

No glare found

Northern Array and OP 35

No glare found

Northern Array and OP 36

No glare found

Northern Array and OP 37

No glare found

Northern Array and OP 38

No glare found

Northern Array and OP 39

No glare found

Northern Array and OP 40

No glare found

Northern Array and OP 41

No glare found

Northern Array and OP 47

No glare found

Northern Array and OP 48

No glare found

Northern Array and OP 49

No glare found

Northern Array and OP 50

No glare found

Northern Array and OP 51

No glare found

Northern Array and OP 52

No glare found

Northern Array and OP 53

No glare found

Northern Array and OP 54

No glare found

Northern Array and OP 55

No glare found

PV: Southern Array potential temporary after-image

Receptor results ordered by category of glare

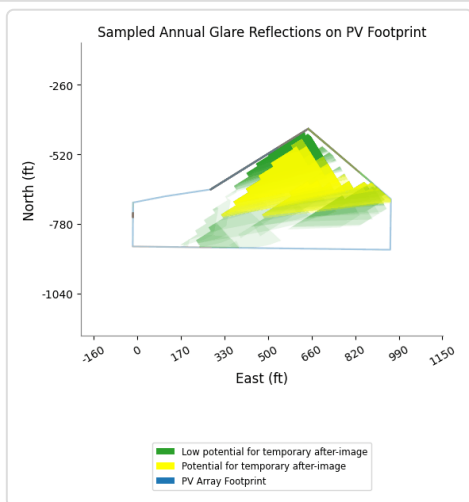
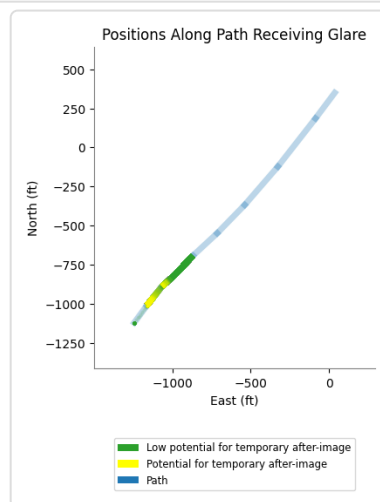
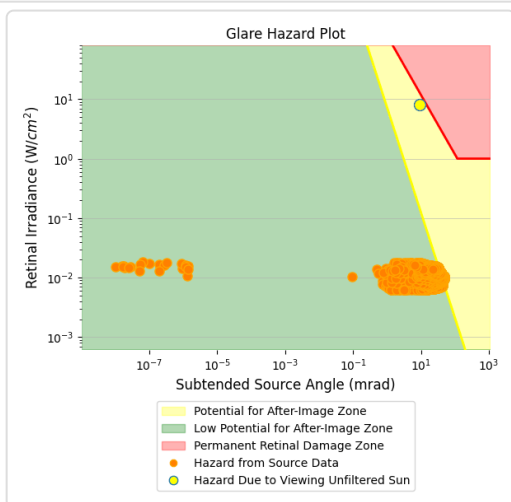
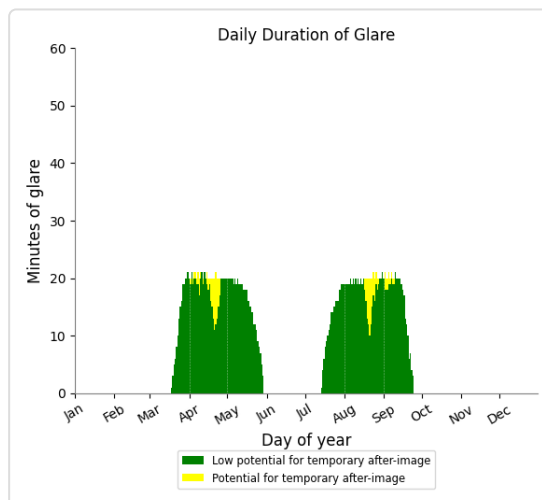
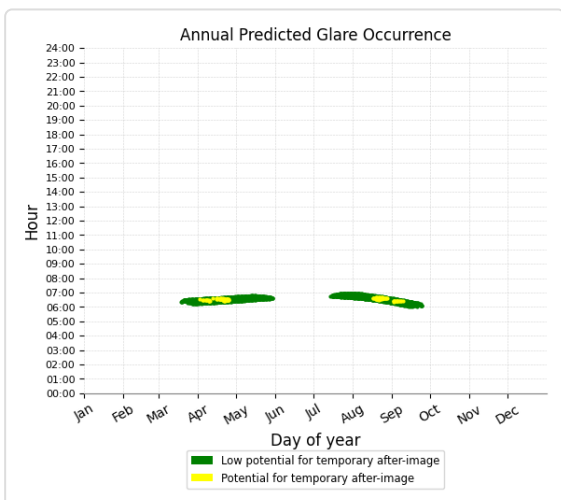
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
Cloverleaf Road - SR 4025	2,331	38.9	136	2.3
Knoll Drive	2,384	39.7	1,144	19.1
Rob Drive	165	2.8	332	5.5
Schwanger Road	1,702	28.4	269	4.5
SR 283 North Cartway	2,875	47.9	1,737	28.9
SR 283 South Cartway	2,233	37.2	3,971	66.2
SR 283 South On-Ramp	1,065	17.8	1,288	21.5
OP 13	1,368	22.8	421	7.0
OP 15	1,569	26.1	1,415	23.6
OP 17	1,692	28.2	491	8.2
OP 42	1,832	30.5	1,161	19.4
OP 43	2,212	36.9	1,289	21.5
OP 45	2,219	37.0	96	1.6
OP 40	723	12.1	0	0.0
OP 41	457	7.6	0	0.0
OP 44	1,076	17.9	0	0.0
OP 1	0	0.0	0	0.0
OP 2	0	0.0	0	0.0
OP 3	0	0.0	0	0.0
OP 4	0	0.0	0	0.0
OP 5	0	0.0	0	0.0
OP 6	0	0.0	0	0.0
OP 7	0	0.0	0	0.0
OP 8	0	0.0	0	0.0
OP 9	0	0.0	0	0.0
OP 10	0	0.0	0	0.0
OP 11	0	0.0	0	0.0
OP 12	0	0.0	0	0.0
OP 14	0	0.0	0	0.0
OP 16	0	0.0	0	0.0
OP 18	0	0.0	0	0.0
OP 19	0	0.0	0	0.0
OP 20	0	0.0	0	0.0
OP 21	0	0.0	0	0.0
OP 22	0	0.0	0	0.0
OP 23	0	0.0	0	0.0
OP 24	0	0.0	0	0.0
OP 25	0	0.0	0	0.0
OP 26	0	0.0	0	0.0

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
OP 27	0	0.0	0	0.0
OP 28	0	0.0	0	0.0
OP 29	0	0.0	0	0.0
OP 30	0	0.0	0	0.0
OP 31	0	0.0	0	0.0
OP 32	0	0.0	0	0.0
OP 33	0	0.0	0	0.0
OP 34	0	0.0	0	0.0
OP 35	0	0.0	0	0.0
OP 36	0	0.0	0	0.0
OP 37	0	0.0	0	0.0
OP 38	0	0.0	0	0.0
OP 39	0	0.0	0	0.0
OP 46	0	0.0	0	0.0
OP 47	0	0.0	0	0.0
OP 48	0	0.0	0	0.0
OP 49	0	0.0	0	0.0
OP 50	0	0.0	0	0.0
OP 51	0	0.0	0	0.0
OP 52	0	0.0	0	0.0
OP 53	0	0.0	0	0.0
OP 54	0	0.0	0	0.0
OP 55	0	0.0	0	0.0

Southern Array and Route: Cloverleaf Road - SR 4025

Yellow glare: 136 min.

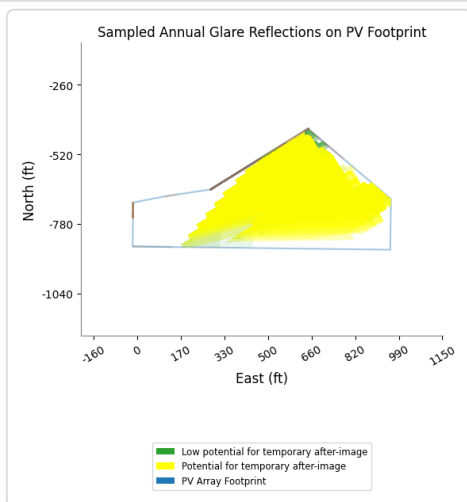
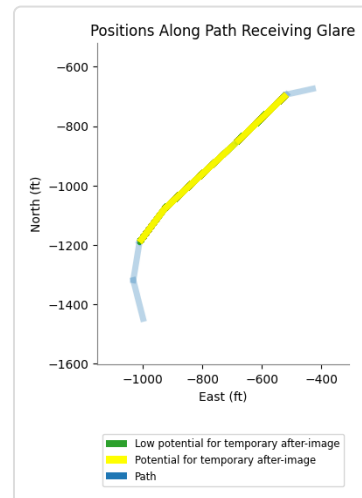
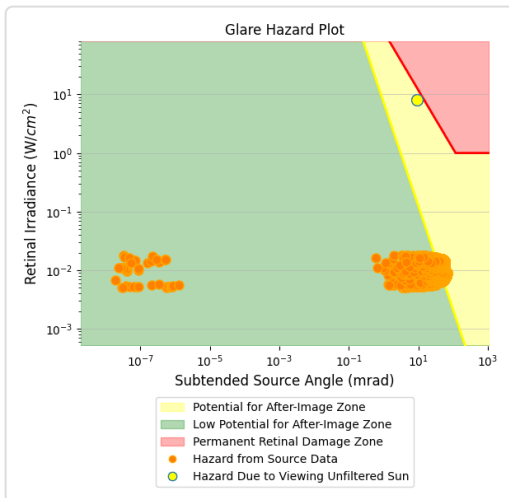
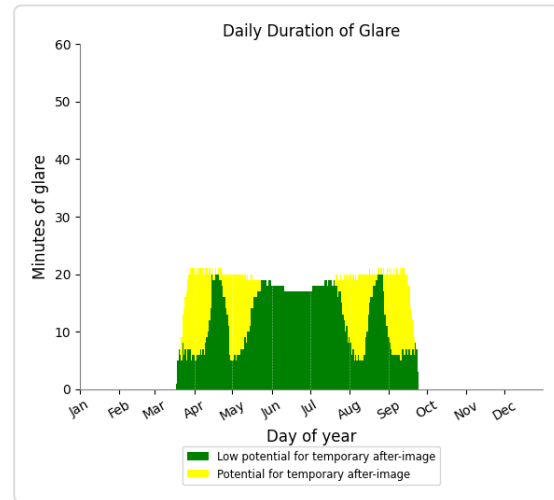
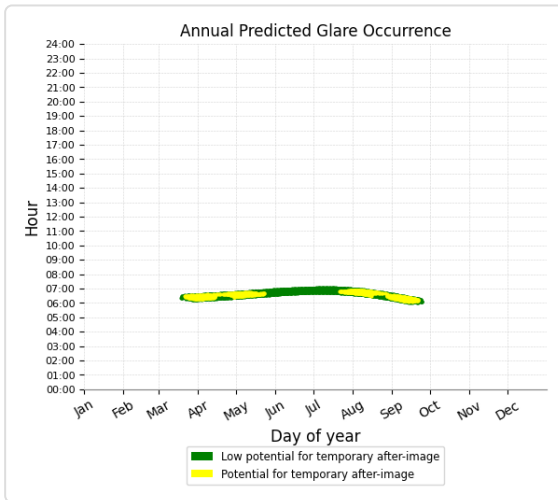
Green glare: 2,331 min.



Southern Array and Route: Knoll Drive

Yellow glare: 1,144 min.

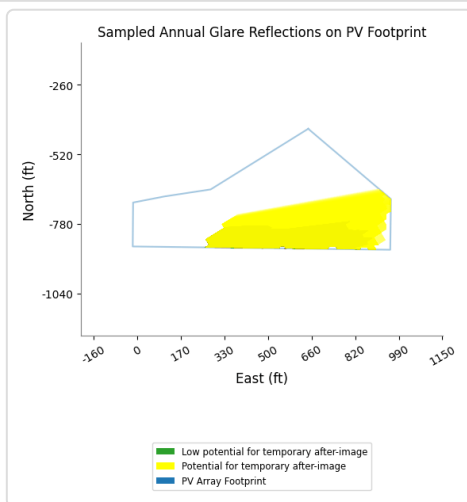
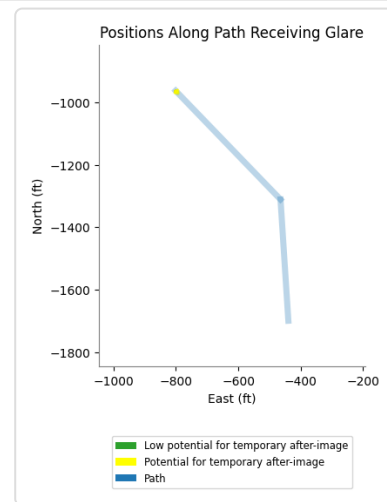
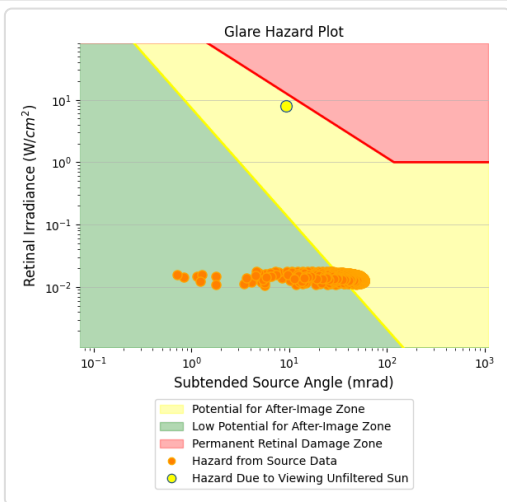
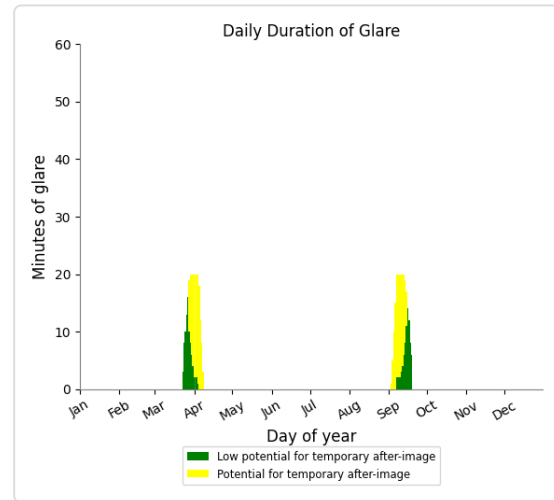
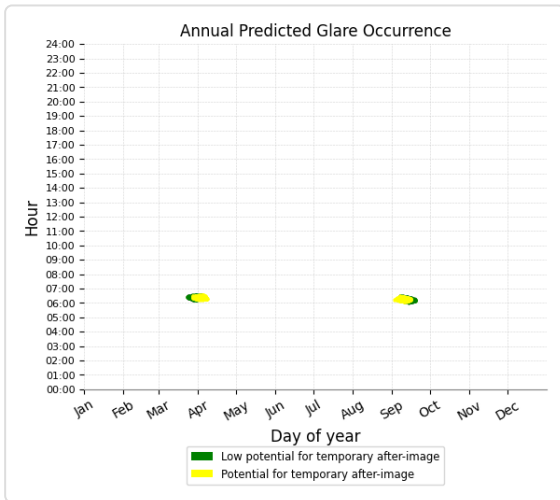
Green glare: 2,384 min.



Southern Array and Route: Rob Drive

Yellow glare: 332 min.

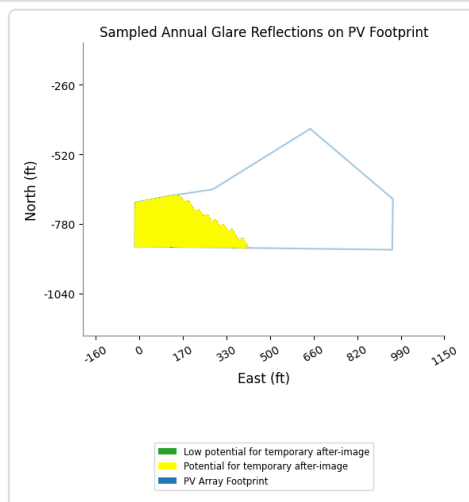
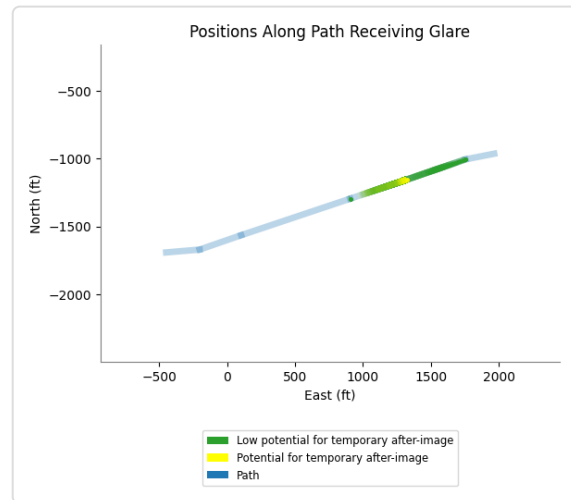
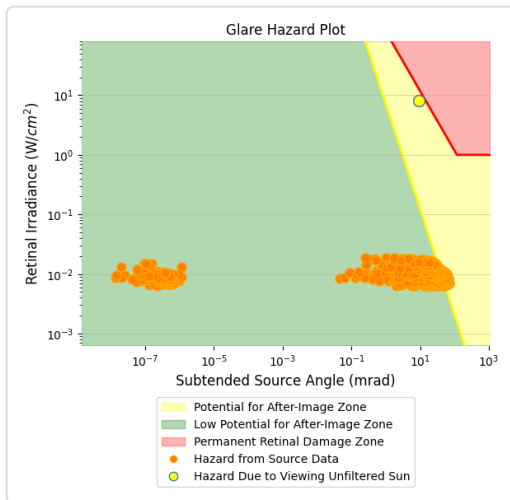
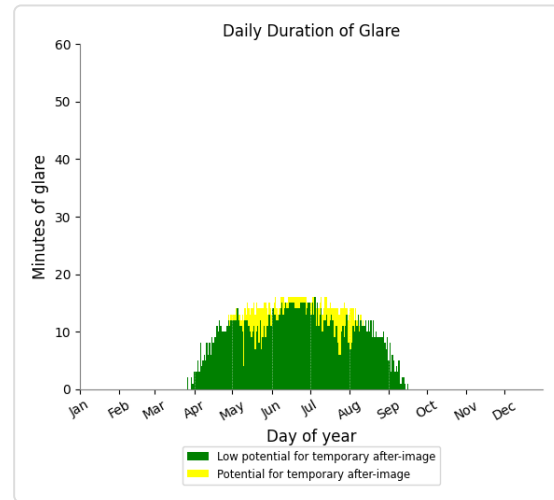
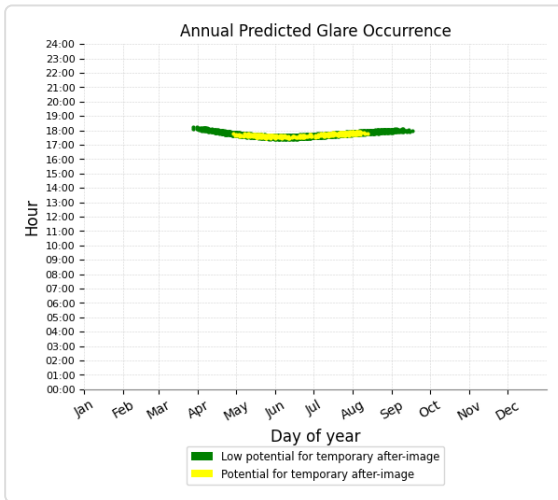
Green glare: 165 min.



Southern Array and Route: Schwanger Road

Yellow glare: 269 min.

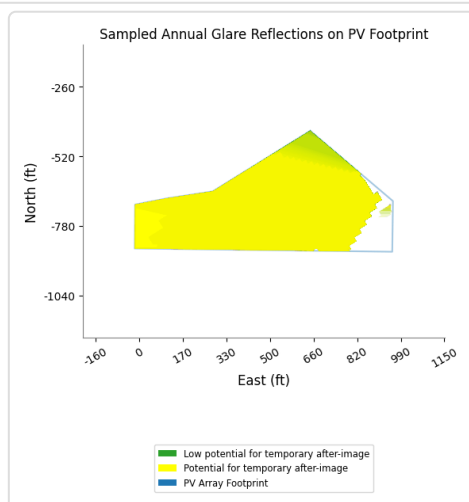
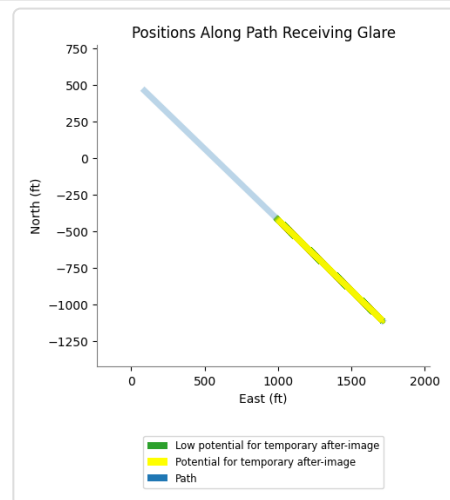
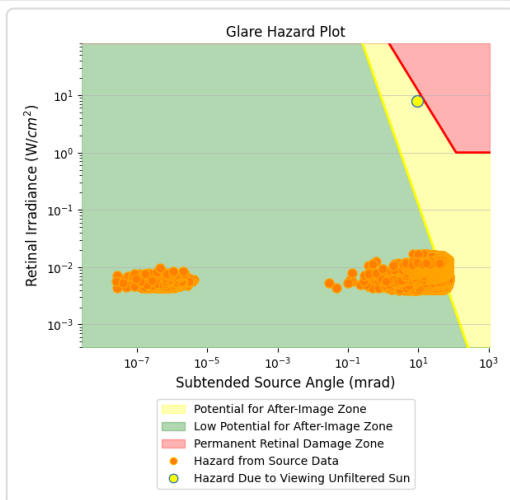
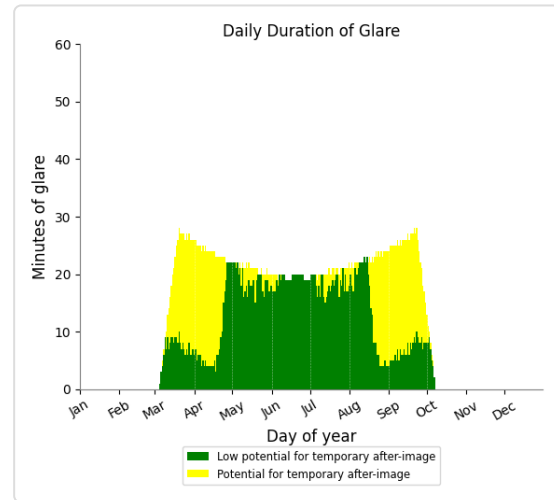
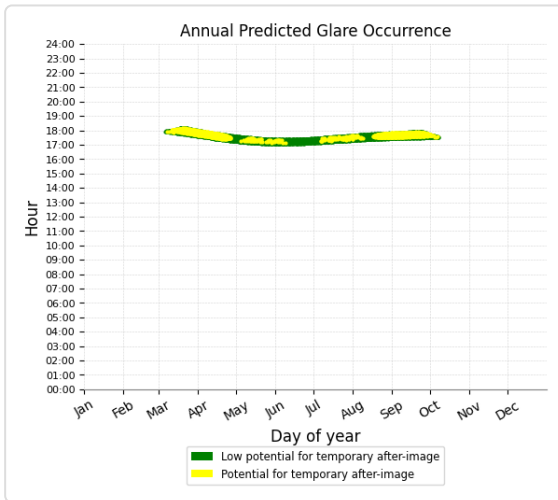
Green glare: 1,702 min.



Southern Array and Route: SR 283 North Cartway

Yellow glare: 1,737 min.

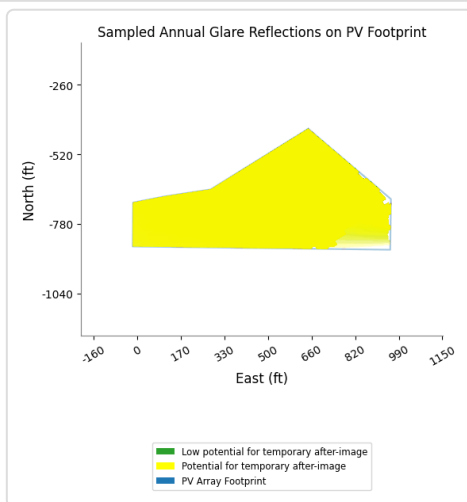
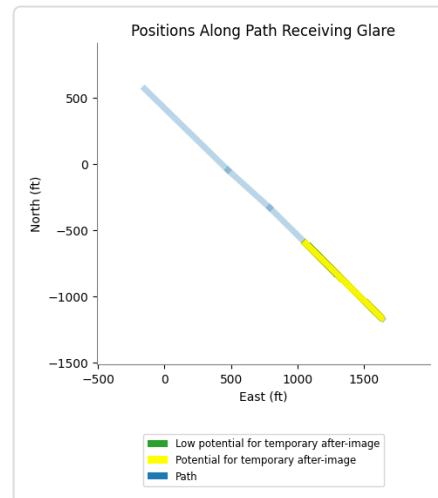
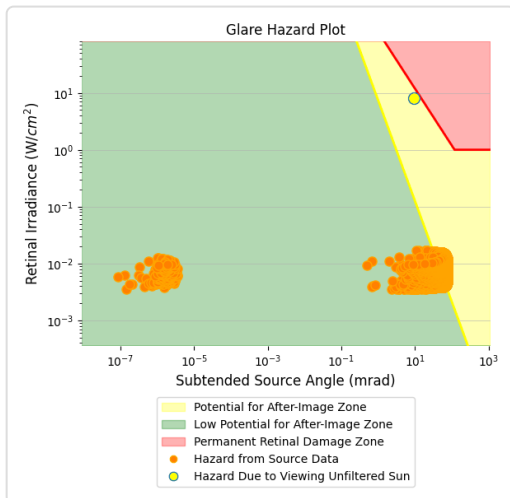
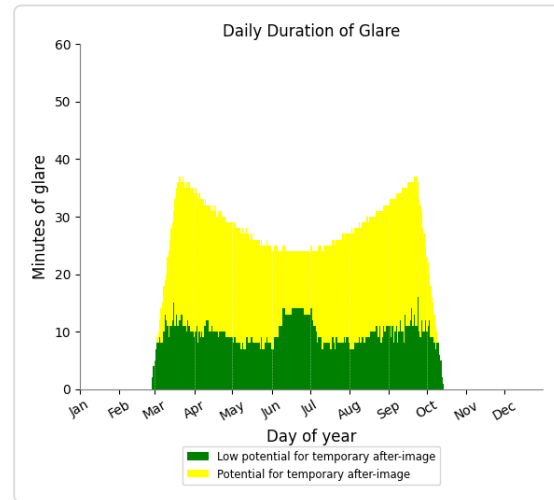
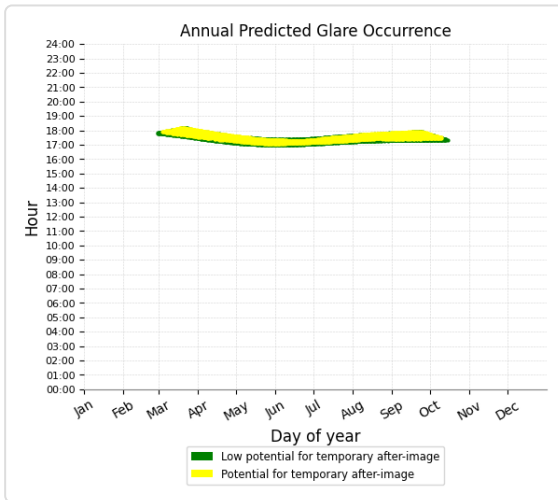
Green glare: 2,875 min.



Southern Array and Route: SR 283 South Cartway

Yellow glare: 3,971 min.

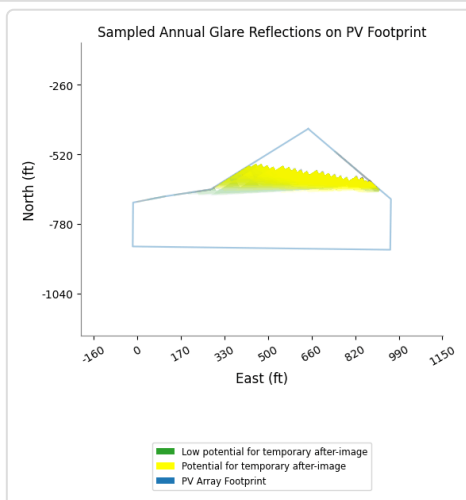
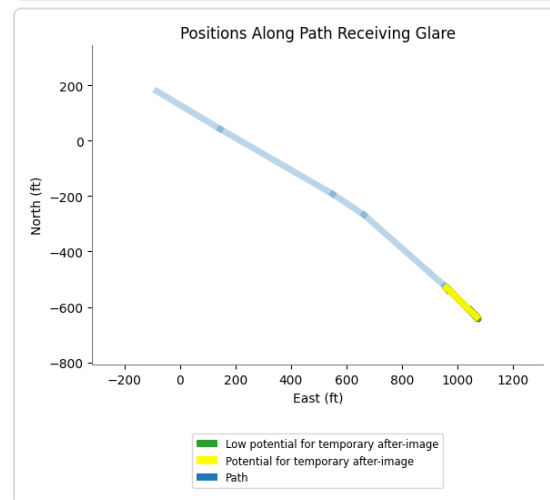
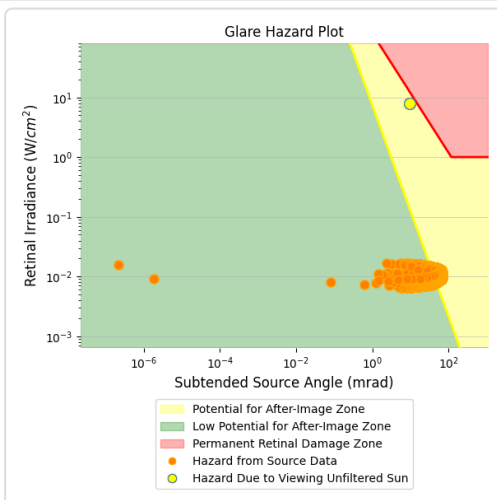
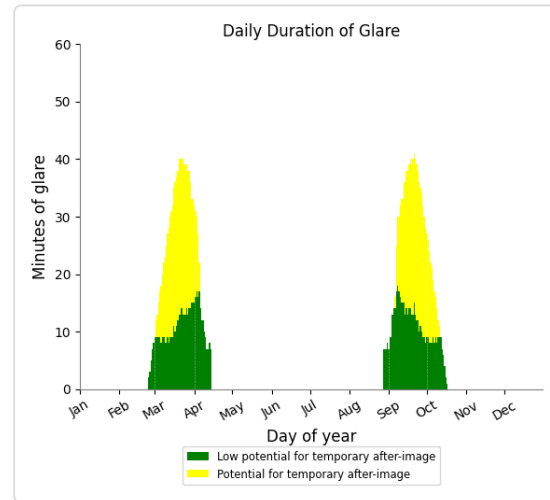
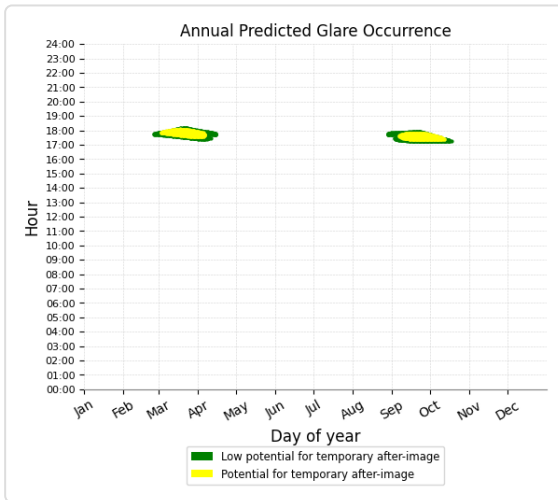
Green glare: 2,233 min.



Southern Array and Route: SR 283 South On-Ramp

Yellow glare: 1,288 min.

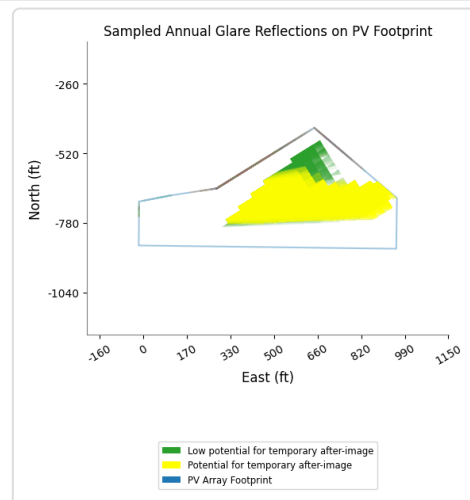
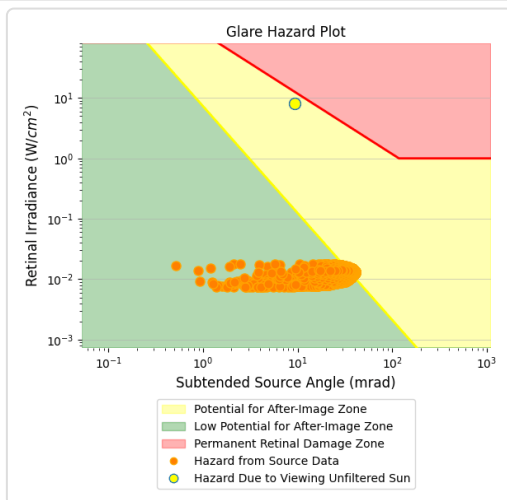
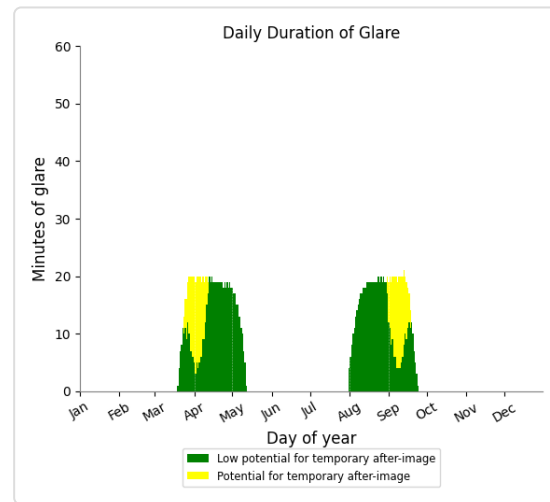
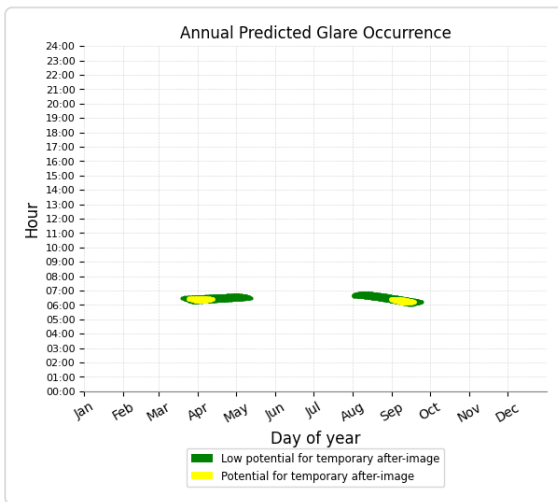
Green glare: 1,065 min.



Southern Array and OP 13

Yellow glare: 421 min.

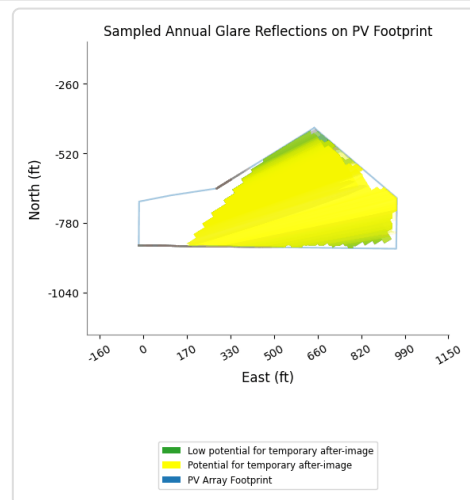
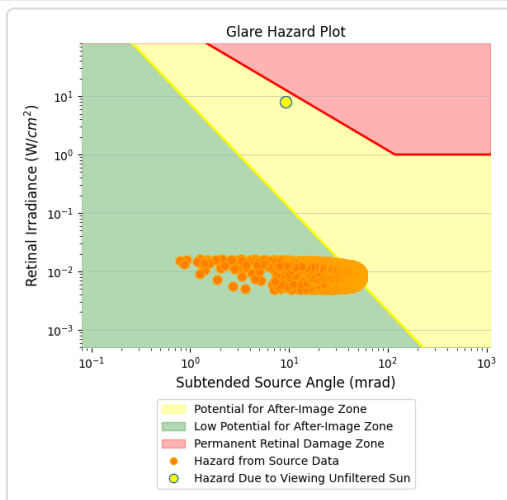
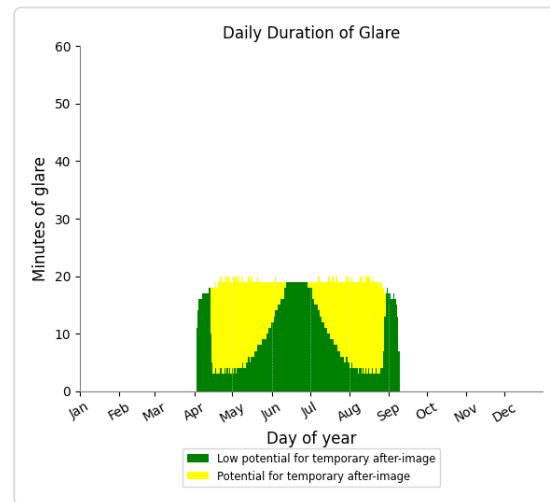
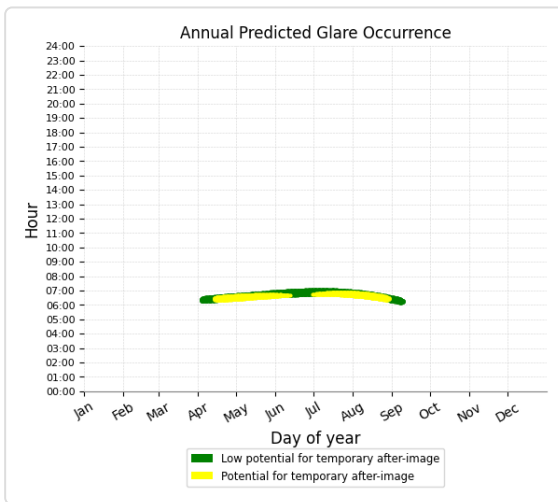
Green glare: 1,368 min.



Southern Array and OP 15

Yellow glare: 1,415 min.

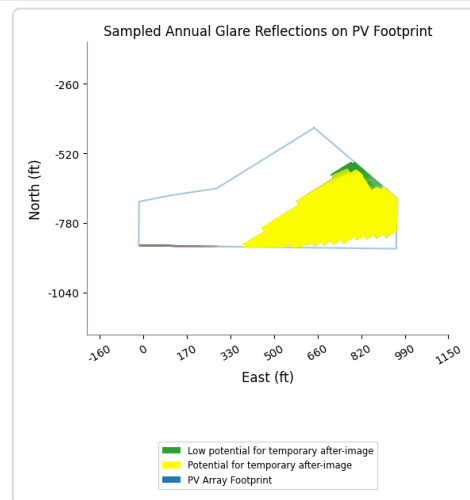
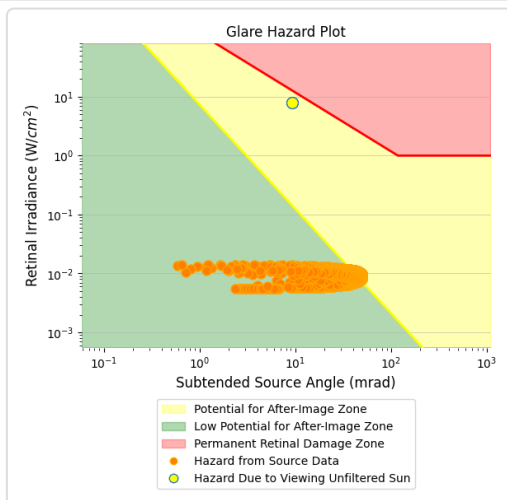
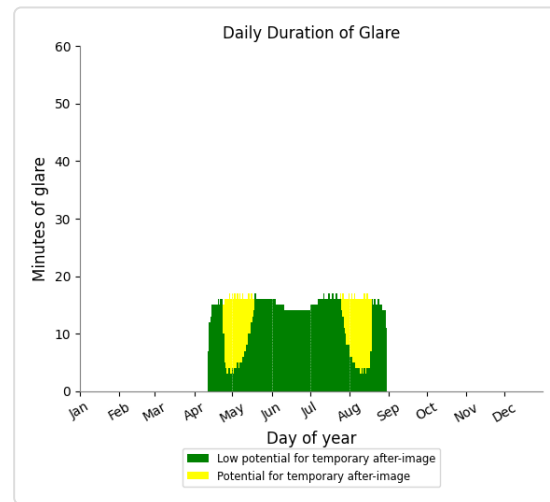
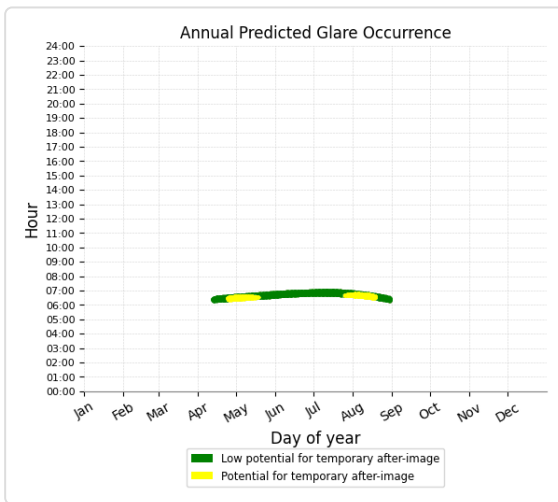
Green glare: 1,569 min.



Southern Array and OP 17

Yellow glare: 491 min.

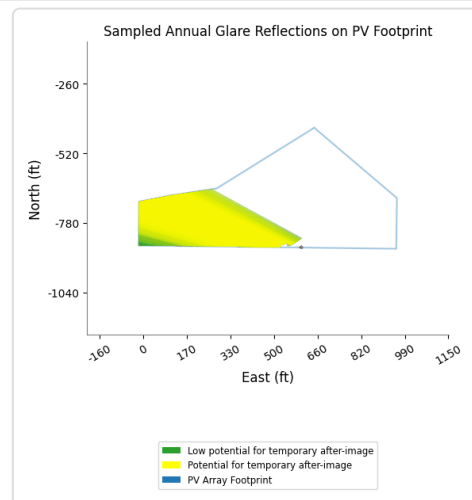
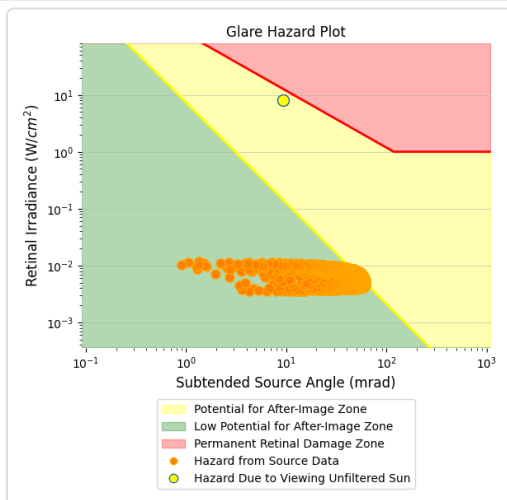
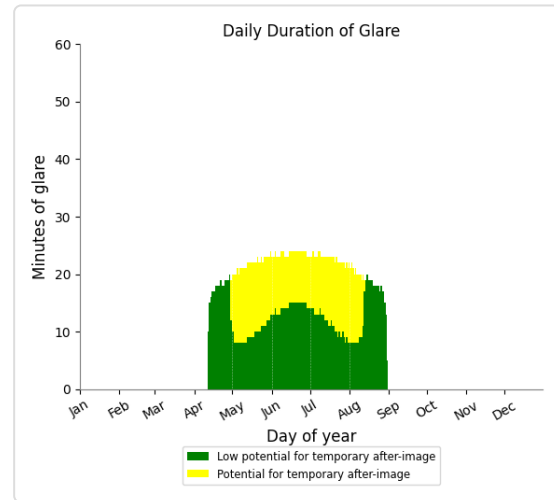
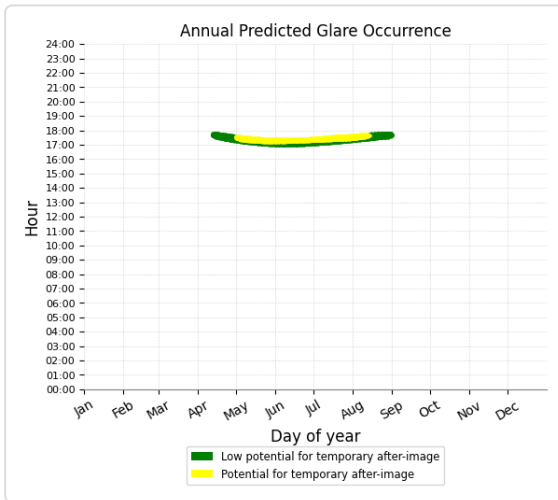
Green glare: 1,692 min.



Southern Array and OP 42

Yellow glare: 1,161 min.

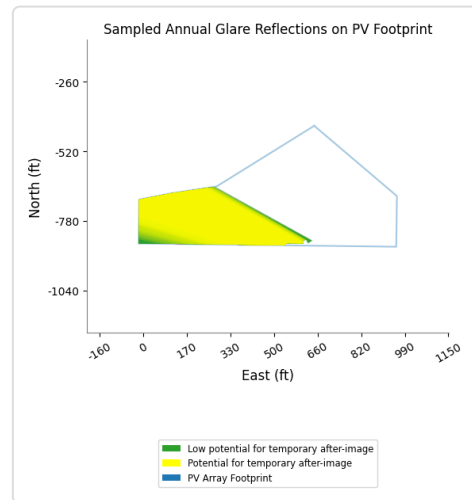
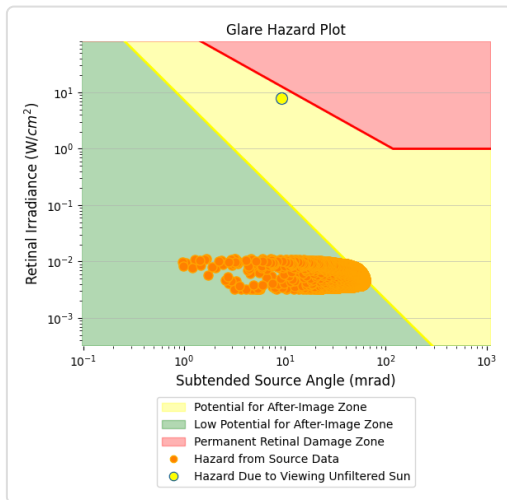
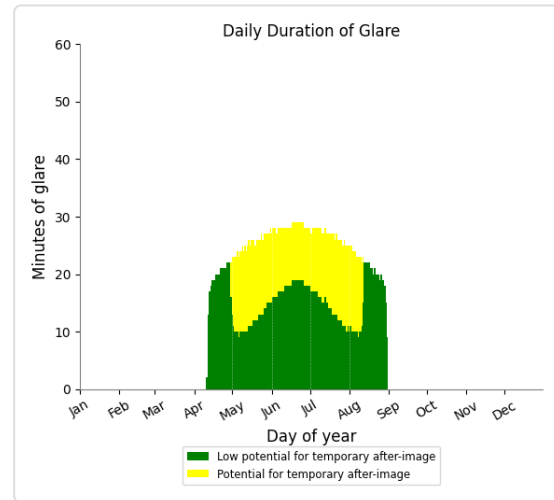
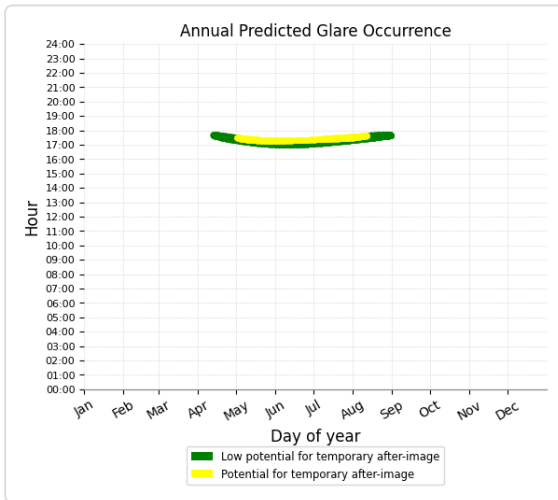
Green glare: 1,832 min.



Southern Array and OP 43

Yellow glare: 1,289 min.

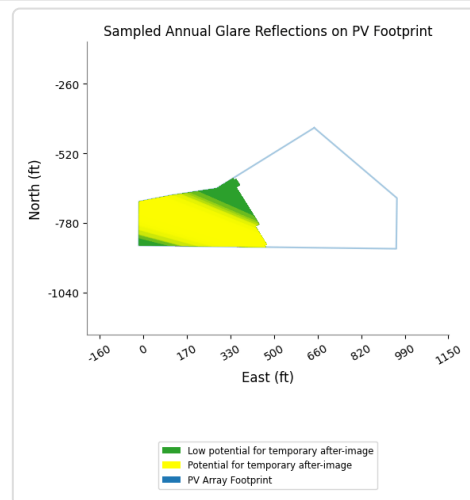
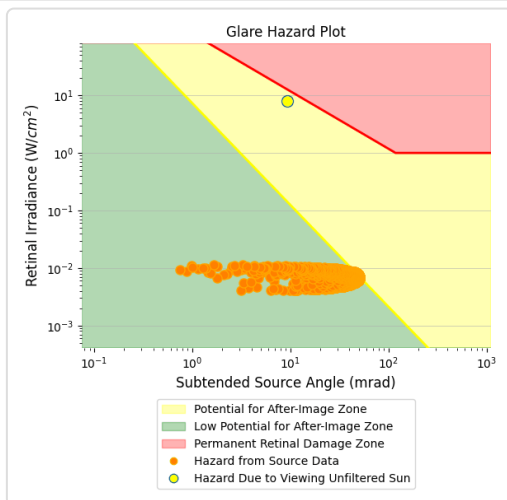
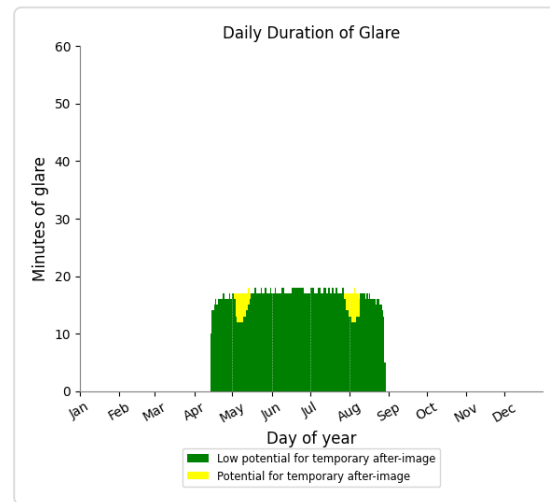
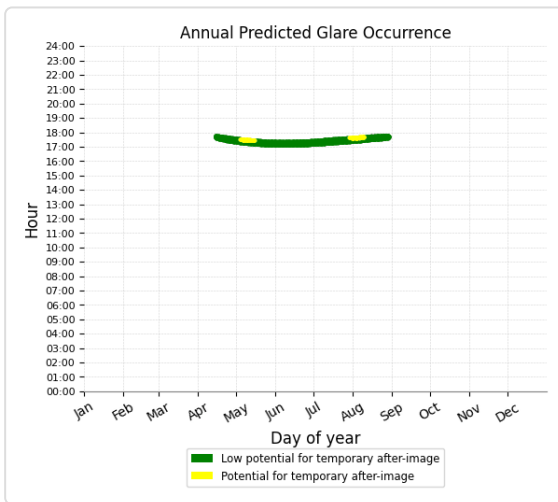
Green glare: 2,212 min.



Southern Array and OP 45

Yellow glare: 96 min.

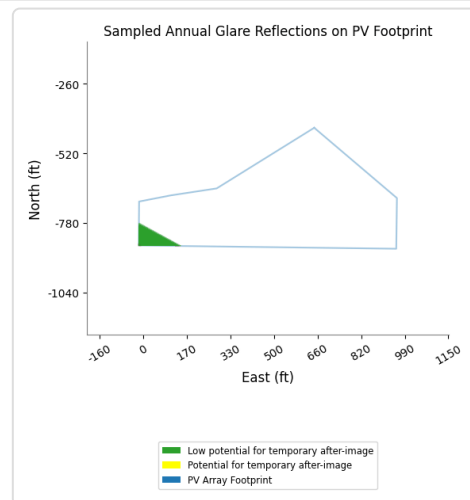
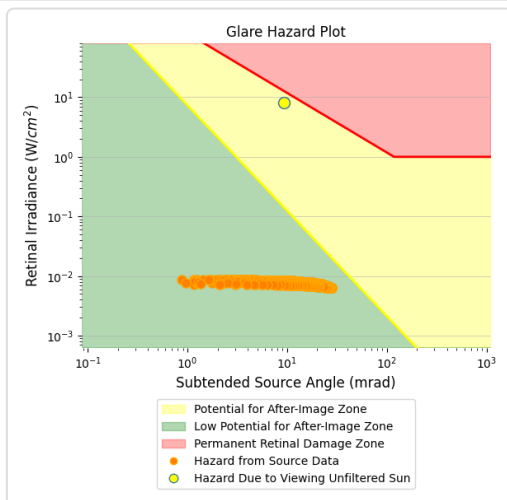
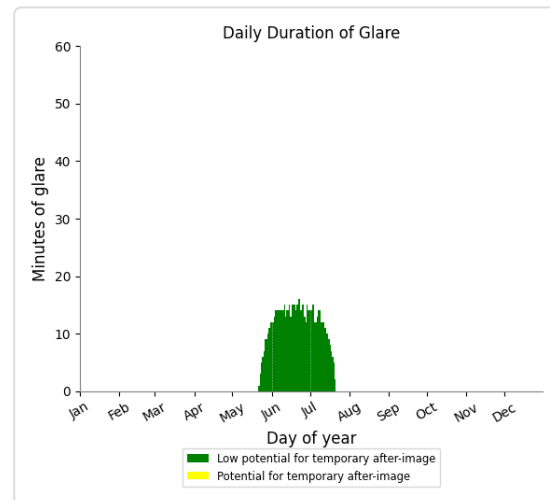
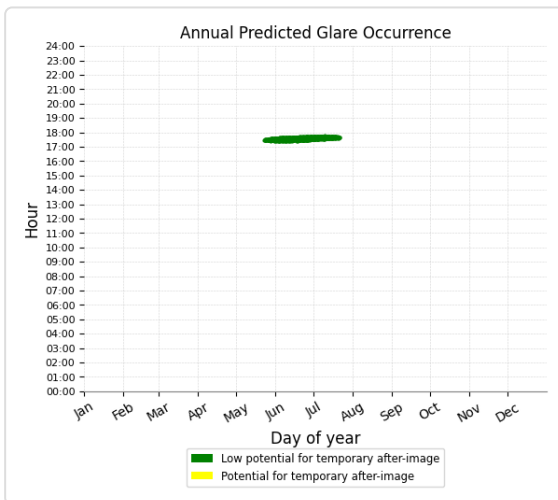
Green glare: 2,219 min.



Southern Array and OP 40

Yellow glare: none

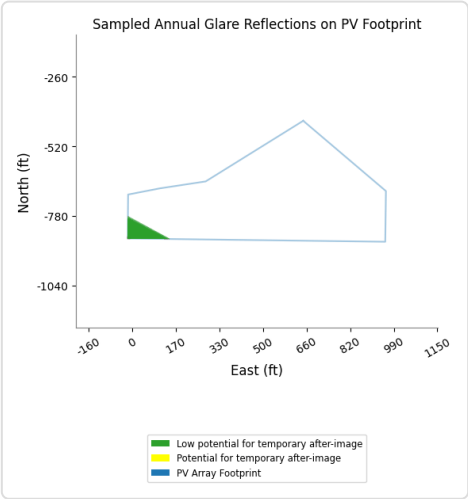
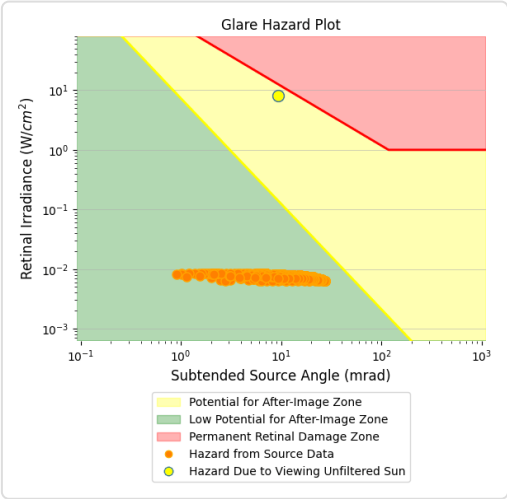
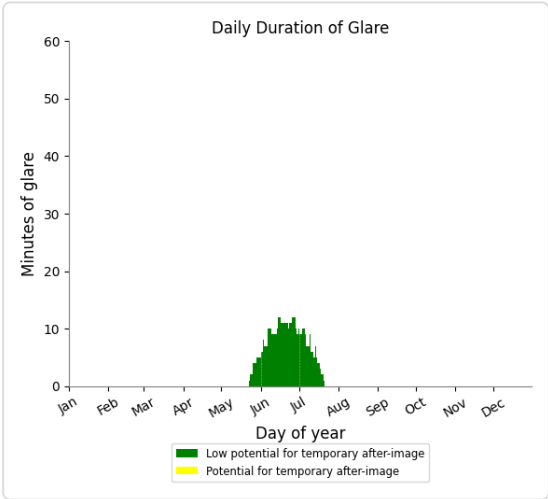
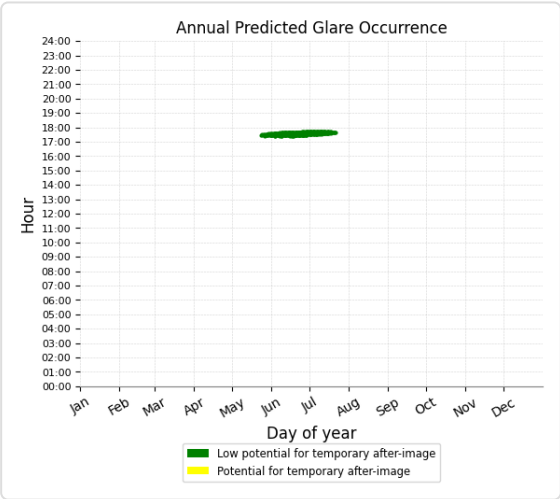
Green glare: 723 min.



Southern Array and OP 41

Yellow glare: none

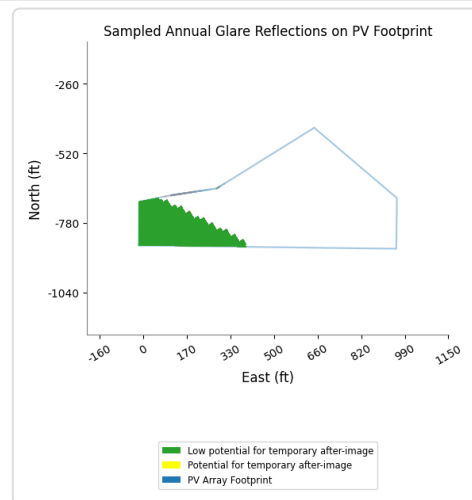
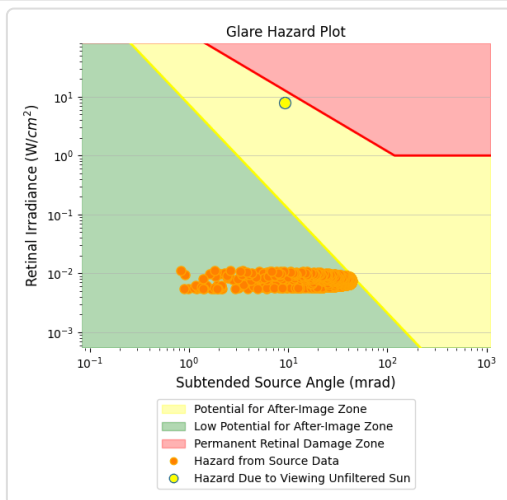
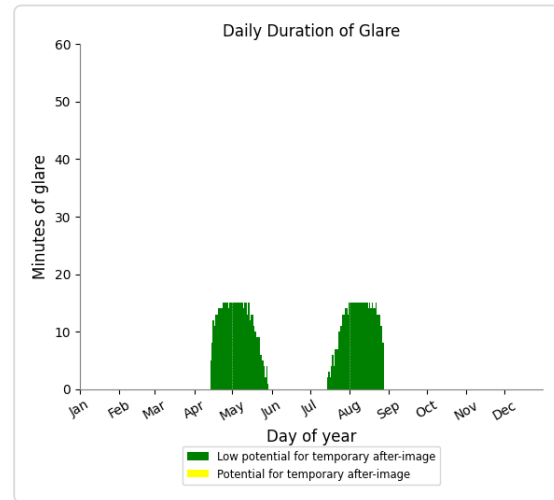
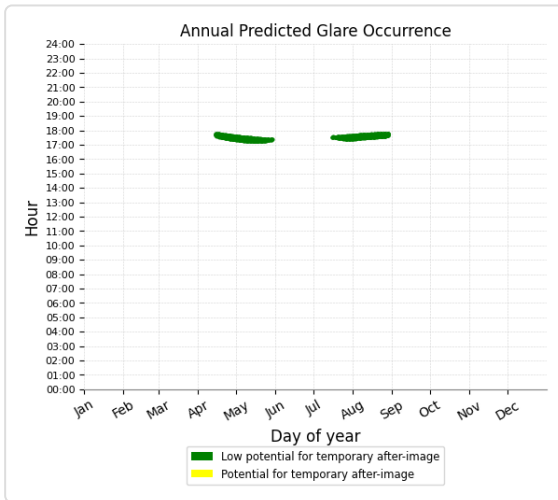
Green glare: 457 min.



Southern Array and OP 44

Yellow glare: none

Green glare: 1,076 min.



Southern Array and OP 1

No glare found

Southern Array and OP 2

No glare found

Southern Array and OP 3

No glare found

Southern Array and OP 4

No glare found

Southern Array and OP 5

No glare found

Southern Array and OP 6

No glare found

Southern Array and OP 7

No glare found

Southern Array and OP 8

No glare found

Southern Array and OP 9

No glare found

Southern Array and OP 10

No glare found

Southern Array and OP 11

No glare found

Southern Array and OP 12

No glare found

Southern Array and OP 14

No glare found

Southern Array and OP 16

No glare found

Southern Array and OP 18

No glare found

Southern Array and OP 19

No glare found

Southern Array and OP 20

No glare found

Southern Array and OP 21

No glare found

Southern Array and OP 22

No glare found

Southern Array and OP 23

No glare found

Southern Array and OP 24

No glare found

Southern Array and OP 25

No glare found

Southern Array and OP 26

No glare found

Southern Array and OP 27

No glare found

Southern Array and OP 28

No glare found

Southern Array and OP 29

No glare found

Southern Array and OP 30

No glare found

Southern Array and OP 31

No glare found

Southern Array and OP 32

No glare found

Southern Array and OP 33

No glare found

Southern Array and OP 34

No glare found

Southern Array and OP 35

No glare found

Southern Array and OP 36

No glare found

Southern Array and OP 37

No glare found

Southern Array and OP 38

No glare found

Southern Array and OP 39

No glare found

Southern Array and OP 46

No glare found

Southern Array and OP 47

No glare found

Southern Array and OP 48

No glare found

Southern Array and OP 49

No glare found

Southern Array and OP 50

No glare found

Southern Array and OP 51

No glare found

Southern Array and OP 52

No glare found

Southern Array and OP 53

No glare found

Southern Array and OP 54

No glare found

Southern Array and OP 55

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.

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.

ForgeSolar default analysis parameters and observer eye characteristics, listed for reference only. The values used for this analysis are given in the site summary above.

- 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

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This analysis was conducted using the best available radiometric modeling at the time of generation. Future updates to the modeling methodology may yield different results.

APPENDIX B.

Analysis Points and Route Receptors

